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WINSTON'S
CUMULATIVE LOOSE-LEAF
ENCYCLOPEDIA
A COMPREHENSIVE REFERENCE WORK

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WINSTON'S CUMULATIVE LOOSE-LEAF ENCYCLOPEDIA

VOLUME IX

Rousay (rö'sā), or ROWSA, one of the Orkney Islands, 5¼ miles long by 4½ miles broad, and 10 miles N. of Kirkwall. Pop. about 800.

Rousseau (rô-sō), JEAN BAPISTE, a French poet, born in Paris in 1670. His quarrelsome disposition and turn for ill-natured satire involved him in almost constant trouble, and he was condemned to exile in 1712 for contumacy in refusing to appear before the law courts. He spent the remainder of his life chiefly in Vienna and the Netherlands, and died at Brussels in 1741. His works consist of sacred and secular odes, cantatas, epigrams, operas, comedies, epistles, etc.

Rousseau, JEAN JACQUES, one of the most celebrated and most influential writers of the eighteenth century, was the son of a watchmaker at Geneva, where he was born in 1712. For the first thirty-five years of his life the chief authority is his own painfully frank, but perhaps not absolutely accurate, *Confessions*, first published in 1782 and 1789. His youth gave little promise of his future eminence, and after a desultory education he was apprenticed in 1725 to an engraver, from whose real or fancied severity he ran away in 1728. He now fell under the notice of Madame de Warens, a lady residing at Annecy, who sent him to a Roman Catholic institution at Turin, where he abjured Protestantism. After several fits of eccentric wandering he went to live with Mme. de Warens at Les Charmettes, a country-house near Chambéry, where they appear to have lived happily for nearly three years. From a short absence at Montpellier, however, Rousseau returned to find his place at Les Charmettes occupied by another, whereupon he departed to become a tutor at Lyons. In 1741 he went to Paris, and in 1743 obtained the post of secretary to the French ambassador at Venice. This office he threw up, and returned to Paris in 1745, to lead a precarious life, copying music and studying science. About this time he became intimate with Diderot, Grimm, D'Holbach, Mme. D'Epinay, etc., and contributed to the *Encyclopédie;* and from this period also dated his connection with Thérèse le Vasseur, with whom, five-and-twenty years later, he went through some form of marriage ceremony. In 1750 his essay, in which he adopted the negative side of the question whether civilization has contributed to purify manners, won a prize offered by the Academy of Dijon, and brought him for the first time into general notice. In 1752 he brought out a successful operetta (the music by himself), and soon after a celebrated *Letter on*

Jean Jacques Rousseau.

French Music. In 1754 he revisited Geneva, where he was readmitted a free citizen on once more embracing Protestantism. Having returned to Paris, he wrote a sort of novel, *Julie ou La Nouvelle Héloïse*, which was published in 1760, being followed by *Le Contrat Social*, a political work, and *Emile ou de l'Education*, another story, in 1762. The principles expressed in these words stirred up much animosity against their

author. The confession of faith of the Savoyard vicar in *Emile* was declared a dangerous attack upon religion, and the book was burned both in Paris and Geneva. Persecution, exaggerated by his own morbid sensibility, forced Rousseau to flee to Neufchâtel, then to the Île St. Pierre in the Lake of Bienne, and finally to England, where he was welcomed by Hume, Boswell, and others in 1766. A malicious letter by Horace Walpole unluckily roused his suspicions of his English friends, and in May, 1767, he returned to France, where his presence was now tolerated. He lived in great poverty, supporting himself by copying music and publishing occasional works. In May, 1778, he retired to Ermenonville near Paris, where he died in the following July, not without suspicion of suicide. His celebrated *Confessions* appeared at Geneva in 1782. Rousseau united an enthusiastic passion for love and freedom with an inflexible obstinacy and a strange spirit of paradox. His life was clouded by a gloomy hypochondria, often developing into suspicion of his truest friends, and embittered by an unreasonable sensitiveness, which some have described as almost actual insanity. The chief importance of his works lies perhaps in the fact that they contain the germ of the doctrines which were carried out with such ruthless consistency in the French revolution. Rousseau was also a musical author and critic of some importance.

Roussette (rö-set'), a name sometimes applied to the frugivorous bats generally.

Roussillon (rö-sē-yōn), a former province of France, now occupied by the department of the Pyrénées Orientales. It gave name to a family of counts.

Rove-beetles, or COCKTAILS, the popular name of certain beetles. The common species is the *Ocypus olens*, the black cocktail, or 'devil's coach-horse.' These beetles are carrion-feeders.

Roveredo (rō-vā-rā'dō), a town of the Tyrol, 34 miles N. of Verona, on the Leno, formerly in Austria, ceded to Italy in 1919. It is the center of the silk trade and has numerous manufactures. Pop. 12,000.

Rovigno (rō-vēn'yō), a seaport on the southwest coast of Istria, 40 miles S. of Trieste, formerly part of Austria, ceded to Italy in 1919. It has shipyards and extensive trade in wine, olive oil, tobacco, etc. Pop. 12,500.

Rovigo (rō-vē'gō), a town in Italy, 23 miles S. W. of Padua, capital of a province of its name, on the Adigetto, an arm of the Adige. The town-house contains a picture-gallery and a library of 80,000 volumes. There is a handsome court-house and two leaning towers belonging to a castle erected in the tenth century. Pop. 12,224.—The province has an area of 685 sq. miles; pop. 269,382.

Rovuma (rō-vö'ma), a river of East Africa, which rises on the E. of Lake Nyassa, and flows nearly due E., with a course of about 500 miles, to the Indian Ocean. The Rovuma is not well adapted for navigation. It marks the boundary between the territory of Germany and Portugal.

Rowan-tree (rou'an), ROAN-TREE, or MOUNTAIN-ASH (*Pyrus Aucuparia*), nat. order Rosaceæ, is a native of Europe and Siberia, common in Britain, particularly in the Highlands. Its leaves are pinnate, leaflets uniform, serrated, glabrous. It has numerous white flowers in corymbs. The fruit consists of clusters of small red berries, bitter to the taste. The tree attains a height of from 20 to 40 feet, and affords timber much used by toolmakers and others. The bark is used by tanners and the berries yield a dye. The rowan-tree was formerly regarded as an object of peculiar veneration, and a twig of it was supposed to be efficacious in warding off evil spirits. It is also called *quicken-tree* and *quick-beam*.

Rowe (rō), NICHOLAS, an English dramatic poet, born in 1673 at Little Barford, Bedfordshire, was a king's scholar at Westminster under Dr. Busby, studied law at the Middle Temple, but on his father's death devoted himself to literature. He filled several lucrative posts, and in 1715 he was made poet-laureate in succession to Nahum Tate. He died in 1718, and was buried in the Poets' Corner in Westminster. Rowe's tragedies are passionate and forcible in language, and his plots well conceived. His minor pieces are unimportant, but his translation of Lucan's *Pharsalia* has been deservedly praised. His best plays are the *Fair Penitent* and *Jane Shore;* others are the *Ambitious Stepmother, Tamerlane, Ulysses, The Royal Convert,* and *Lady Jane Grey.* His comedy of the *Biter* was a failure.

Rowing, is the art of propelling a boat by means of oars, which act as levers of the second order, the work being done between the power (*i.e.*, the rower) and the fulcrum (*i.e.*, the water, of which the actual displacement is very slight). That part of the operation during which the power is actu-

ally being applied, *i.e.*, when the oar is in the water, is specifically called the stroke; while feathering is the act of turning the blade of the oar so as to be parallel to the surface of the water, and carrying it thus through the air into position to repeat the stroke. Much skill is required to perform these operations satisfactorily; and in fact rowing can be learned only from observation and practice. Technically the word 'rowing' is used by boating-men only when each oarsman has but a single oar; when he has one in each hand he is said to 'scull,' and the oars are called 'sculls.' Although rowing is certainly one of the most ancient methods of propelling vessels, it has only comparatively recently come into prominence as a form of sport. Boat racing practically dates from the first quarter of the nineteenth century, and its development has lain almost entirely in the hands of the Anglo-Saxon races. The Thames has always been the leading resort of amateur oarsmanship, which had attained some little vigor before the first boat race between Oxford and Cambridge universities took place in 1829. The second took place in 1836; and since 1856 the contest has been annual, the course (since 1864) being from Putney to Mortlake, about 4½ miles. Of the very numerous amateur regattas which are held all over Great Britain, the chief is that at Henley-on-Thames, held annually since 1839. In the United States the first amateur rowing club was founded in 1834, but the sport did not make much progress until the universities of Yale (in 1843) and Harvard (in 1844) took it up, followed by other universities. Yale and Harvard have competed annually since 1878 and most of the other universities have rowing clubs. The chief regatta is held on different courses in different years by the National Association of Amateur Oarsmen, founded in 1873. Holland, Germany, and other countries have rowing clubs of importance. Racing boats are called eight-oared or 'eights,' 'fours,' 'pairs,' etc., according to the number of rowers. 'Sixes' and 'double-scullers' are more common in America than in Great Britain. The use of outriggers was introduced about 1844, that of sliding-seats, an American invention, about 1871.

Rowland (rō'land), HENRY AUGUSTUS, physicist, born at Honesdale, Pennsylvania, in 1845; died June 16, 1901. He became professor of physics at Johns Hopkins University in 1876 and was made a member of the National Academy of Sciences in 1881. He made important discoveries in magnetic activities and invented a process for ruling diffraction gratings which is of much value in spectrum analysis.

Rowley Regis (rou'li rē'jis), a town of Staffordshire, England, partly within the parliamentary borough of Dudley and similar to it in its industries. Pop. 37,000.

Rowlock (rō'lok), a contrivance on a boat's gunwale on which the oar rests in rowing; as, a notch in the gunwale, two short pegs, an iron pin, etc.

Roxa'na. See *Alexander.*

Roxburgh (roks'burg), ROXBURGHSHIRE, or TEVIOTDALE, an inland border county of Scotland, is bounded by Dunfries, Cumberland and Northumberland, Berwick, Midlothian and Selkirk. Area, 665 sq. miles. The Cheviot Hills stretch along the south border, where the loftiest summit is Auchopecairn (2382 feet). The chief river is the Teviot, a tributary of the Tweed, which also traverses part of the county. The minerals are unimportant, though limestone and sandstone are abundant. Roxburghshire is chiefly occupied by valuable sheep walks, but its arable farms are also among the best in Scotland. The important woolen manufacture is confined to the towns, of which the chief are Hawick (county town), Jedburg and Melrose. Pop. 48,804.

Roxbury (roks'bėr-i), a former city of Suffolk Co., Massachusetts, 3 miles s. w. of Boston. It was incorporated with Boston in 1867. It has many handsome residences and gardens and numerous manufactures.

Roy (roi), WILLIAM, antiquarian and geodesist, was born in 1720, near Lanark in Scotland; died in 1790. He entered the army and attained the rank of major-general. In 1746 he made the survey of Scotland afterwards known as the 'Duke of Cumberland's Map.'

Royal Academy. See *Academy.*

Royal Arcanum, a fraternal organization formed in Boston, Mass., in 1877. The membership of the order in 1915 was 250,000. Meetings of the Supreme Council are held in Boston, but some 2000 subordinate councils are in operation throughout the various States.

Royal Household, those persons who hold posts in connection with the household of the British sovereign, including the keeper of the privy-purse and private secretary, lord steward, treasurer, comptroller,

master of the household, lord chamberlain, vice-chamberlain, master of the horse, captains of the gentlemen-at-arms and yeomen of the guard, master of the buckhounds, earl-marshal, grand falconer, lord high almoner, hereditary grand almoner, mistress of the robes, maids of honor, lords-in-waiting, master of ceremonies, physicians in ordinary, poet-laureate, etc.

Royal Institution of Great Britain, founded in 1799, incorporated by royal charter in 1800, for diffusing knowledge and facilitating the general introduction of mechanical inventions, and for teaching the application of science to the common purposes of life. The members are elected by ballot, and pay an admission fee and annual subscription. The buildings at Albemarle St., Piccadilly, London, contain a laboratory, library, and museum, and among the lecturers occur the names of Dr. Thomas Young, Sir Humphry Davy, Faraday, Tyndall, Huxley, Carpenter, Lord Rayleigh and other eminent men.

Royal Society (LONDON), THE, the oldest learned society out of Italy, was founded for the study and promotion of natural science. It owes its origin to a club of learned men who were in the habit of holding weekly meetings in London as early as 1645, but the year 1660 is generally given as the year of its foundation. Charles II took much interest in the proceedings of the society, and in 1682 granted a charter to the 'President, Council, and Fellows of the Royal Society of London for Improving Natural Knowledge.' Lord Brouncker was first president of this incorporated Royal Society. Meetings are held weekly from November to June for the purpose of reading and discussing scientific papers; and the more important of these are published in the annual *Philosophical Transactions*, first issued in 1665, and now forming a most valuable series. Accounts of the ordinary meetings, with abstracts of papers, etc., appear also in the periodical *Proceedings*, begun in 1800. Scientific research has at all times been both initiated and encouraged by the Royal Society, and many of the most important scientific achievements and discoveries have been due to its enlightened methods. It deservedly enjoys an influential and semiofficial position as the scientific adviser of the British government, and not only administers the £4000 annually voted by parliament for scientific purposes, but has given suggestions and advice which have borne valuable fruit, from the voyage of Capt. Cook in the *Endeavor* in 1768 down to the *Challenger* expedition, more than a century later. The society has an independent income from property of less than £5000, besides the annual subscriptions of £4 from each fellow. It awards the Copley, Davy and two royal medals annually, and the Rumford medal biennially, for distinction in science; the first being the blue riband of scientific achievement, and bestowed both on foreign and British savants. The Royal Society met in Gresham College until 1710, with the exception of eight years after the great fire of London, in 1666, when they found a welcome in Arundel House from Henry Howard, who presented his learned guests with the library purchased by his grandfather, Earl of Arundel, thus forming the nucleus of the present valuable library of the Royal Society, which contains about 50,000 volumes. From 1710 till 1780 the meetings of the society were held in Crane Court, thereafter in Somerset House, and finally since 1857 in its present quarters at Burlington House. The roll of the Royal Society contains practically all the great scientific names of its country since its foundation. Among its presidents have been Lord-chancellor Somers, Samuel Pepys, Sir Isaac Newton, Sir J. Banks, Sir Hans Sloane and Sir Humphry Davy.

Royal Society (EDINBURGH), a society founded and chartered in 1783 for the promotion of all branches of physical and literary research. Among its presidents have been Sir Walter Scott, Sir David Brewster, the Duke of Argyll, and Sir William Thomson.

Royat-les-Bains (rwà-yà-lā-baṇ), a popular bathing place of Central France, dep. Puy-de-Dôme, charmingly situated a short distance from Clermont, 1380 feet above the sea, with warm springs, rich in bicarbonate of soda and common salt. Pop. 1500.

Roye (rwa'y), a town in the Department of the Somme, France, on the Avre River, 26 miles S. E. of Amiens. It was almost obliterated during the great war which broke out in 1914. Captured first by the Germans, it was retaken by the French, and fell again into German hands in the great drive of March, 1918. In 1913 Roye had a population of 4600. The industries were copper, jewelry, sugar, oil and corn.

Royer-collard (rwà-yā-kol-är), PIERRE PAUL, a French philosopher, born in 1763. He became an advocate, was drawn into

AMERICAN TREE LEAVES, FLOWERS AND FRUITS

1. White pine. 2. Shellbark hickory. 3. Red spruce. 4. Incense cedar. 5. Hemlock. 6. Black walnut. (Only 6 leaflets shown. They number from 13 to 23.) 7. Redwood. 8. Chestnut. 9. Cottonwood. 10. Red birch.

the political vortex of the period, and after playing the part of a moderate liberal, withdrew into private life. In 1810 he became professor of philosophy in the University of France. At the restoration of 1814 he resigned his chair, but received various appointments from Louis XVIII, for whose return he had schemed as early as 1798. From 1815 till 1842 he was a member of the chamber of deputies, of which he was president in 1828. He died in 1845. Royer-Collard introduced the philosophy of the Scottish or 'common-sense' school to France, and became the recognized head of the 'doctrinaire' school of which Jouffroy and to a certain extent Cousin were afterwards the chief representatives.

Royston-crow, the common English name for the hooded crow, *Corvus cornix*. See *Crow*.

Rshev. See *Rzhev*.

Ruabon (ru-a-bon′), a town of N. Wales, in Denbighshire, with extensive collieries and iron-works. Pop. (parish), 23,929.

Ruad. See *Aradus*.

Ruatan, or ROATAN (rō-a-tän′), an island in the Bay of Honduras, chief of the Bay Islands (which see), is about 30 miles long and 10 miles broad. Pop. 2000–4000. The chief harbor is Port Royal.

Rubasse (ru-bas′), a lapidaries' name for a beautiful variety of rock crystal, speckled in the interior with minute spangles of specular iron, reflecting a color like that of the ruby. There is also a kind of artificial rubasse.

Rubber. See *India-rubber*.

Rubble Walls, are walls constructed of irregular unhewn stones, either with or without mortar. In 'coursed rubble-work' the stones are roughly dressed and laid in horizontal courses; in uncoursed rubble the stones are built up together, large and small, being fitted to each other's forms with more or less exactness.

Rubefacient (rö-be-fā′shi-ant), in medicine, agents which, when applied externally as stimulants to the skin, occasion also a redness. The most commonly used rubefacients are ammonia, mustard, Cayenne pepper, oil of turpentine, powdered ginger, etc.

Rubellite (rö′bel-īt), or red tourmaline, used as a gem-stone; a siliceous mineral of a red color of various shades, sometimes called siberite. It acquires opposite electricities by heat. Its crystals occur in coarse granite rocks.

Rubens (rö′benz), PETER PAUL, the most eminent painter of the Flemish school, was born in 1577 at Siegen in Westphalia, though his childhood was spent chiefly at Cologne. After the death of his father, in 1587, Rubens' mother returned with him to Antwerp, where he received a liberal education, laying the foundation for his later reputation as one of the most learned and accomplished men of his time. His bent towards painting early revealed itself, and under his first masters, Verhaegt, Adam Van Noort and Otto Van Veen, he made rapid progress, and in 1598 was admitted as a master of the guild of painters in Antwerp. In 1600 he went to Italy, where he remained till 1608, chiefly at the court of the Duke of Mantua. On his return to the Netherlands his reputation was already great, and the Archduke Albert attached him to his court, with a salary of 500 livres. Rubens married his first wife, Isabella Brant, in 1609, and settled down in Antwerp to a successful and brilliant career, his studio crowded with pupils, to whose assistance, indeed, his detractors attributed the surprising number of pictures he turned out. In 1621 he was employed by Marie de' Medici to design for the gallery of the Luxembourg the well-known series of magnificent allegorical pictures illustrating the life of that princess. After the death of his wife, in 1626, he was employed by the Archduchess Isabella in endeavoring to arrange a truce between Spain and the Netherlands; in 1628 he was engaged in the important private negotiations of a peace between Spain and England, in the course of which he visited Madrid and England (in 1629). He was knighted by Charles I, and his brush, never idle either in Madrid or London, decorated the ceiling of the banqueting-house at Whitehall. In 1630 he married Helena Fourment, who appears in many of his later works, and settled once more in Antwerp, where he continued to produce numerous pictures until his death in May, 1640. Rubens was indisputably the most rapid of the great masters, and was remarkable for his fondness for large canvases. His great characteristics are freedom, animation, and a striking brilliancy and disposition of color; while some critics reproach him with an unchastened exuberance of form, and an almost total absence of sublime and poetical conception of character. His works are in all branches of his art — history, landscape, portraiture and genre — and are met with all over Europe. The *Descent from the Cross* in Antwerp Cathedral is gen-

erally considered his master-piece. His pictures number upwards of 2000, exclusive of about 500 drawings, a few etchings, etc.

Rube'ola. See *Measles.*

Rübezahl (rü'be-tsäl), Number Nip, the famous mountain-spirit of the Riesengebirge, in Germany, who is sometimes friendly and sometimes mischievous. He is the hero of numberless poems and legends.

Rubia (rö'bi-a), a genus of plants, type of the order Rubiaceæ, inhabiting Europe and Asia. Several species are employed in medicine and the arts. *R. tinctorum* is the madder plant, *R. cordifolia* is munjeet.

Rubiaceæ (rö-bi-ā'she-ē), a large nat. order of exogenous plants, under which many botanists include the orders Cinchonaceæ and Galiaceæ. It thus includes all monopetalous plants with opposite leaves, interpetiolar stipules, stamens inserted in the tube of the corolla and alternating with its lobes, and an inferior compound ovary. The typical genus is *Rubia* (which see).

Rubicon (rö'bi-kun), a river in N. Italy (now the Fiumicino, a tributary of the Adriatic), famous in Roman history, Cæsar having by crossing this stream (49 B.C.), at that time regarded as the northern boundary of Italy, finally committed himself to the civil war. Hence the phrase 'to cross the Rubicon' is to take the decisive step by which one commits one's self to a hazardous enterprise.

Rubidium (rö-bid'i-um), a rare metal discovered by Bunsen and Kirchhoff in 1860, by aid of spectrum analysis; symbol Rb, atomic weight 85.4. It is a white, shining metal, and at ordinary temperatures it is soft as wax. It is usually found in connection with cæsium, and belongs to the group of the alkali metals. See *Cæsium.*

Rubinstein (rö'bin-stīn), ANTON GRIGORYEVITCH, a Russian composer and pianist, born in 1829. In 1839 he made an extensive European tour, playing on the piano to enthusiastic audiences; and in 1842 he visited England. He then studied for eighteen months in Paris; studied and taught at Berlin and Vienna; and returned to Russia in 1848, where he devoted himself to farther study and to composing until 1856. On his reappearance in the concert-room his fame was at once assured by his phenomenal skill on the pianoforte, and his numerous tours formed a series of unbroken successes. In 1858 he established his headquarters at St. Petersburg, and assisted largely in the foundation of the St. Petersburg Conservatoire in 1862, of which he was principal until 1867. In 1869 he was ennobled by the czar. As a composer Rubinstein was exceedingly prolific, being especially successful in his pianoforte pieces. Perhaps his best known work is the *Ocean Symphony.* He died suddenly on Nov. 20, 1894.

Ruble. See *Rouble.*

Rubric (rö'brik), in the canon law, signifies a title or article in certain ancient law books, thus called because written in red letters (*L. ruber*, red). In modern use rubrics denote the rules and directions given at the beginning and in the course of the liturgy for the order and manner in which the several parts of the office are to be performed. Where red ink is not employed now the rubrics are printed in italics, or in some other distinctive character.

Rubruquis (rö'bru-kwis), a distinguished traveler of the middle ages, otherwise WILLEM VAN RUBRUK, after a town in Flanders where he was born about 1215. He became a Franciscan missionary to the Holy Land, and in 1253 was despatched by Louis IX of France on a semipolitical, semiproselytizing mission which took him into the heart of Asia, to the Great Khan of Tartary, then residing in the Gobi Desert. He brought back a mass of details as to the geography, ethnography, languages, manners, and religions of the countries he visited, that are now of the greatest interest and value. Rubruquis died some time after 1293.

Rubus (rö'bus), a genus of plants, nat. order Rosaceæ. There are about a hundred species, among which are the *R. Idæus*, or raspberry-plant; *R. fruticōsus*, or common bramble; and *R. Chamæmōrus*, mountain-bramble or cloudberry.

Ruby (rö'bi), a precious stone of a deep-red color, of which there are two varieties — the oriental and the spinel. The oriental ruby or true ruby is a corundum formed nearly exclusively of alumina, of great hardness, and the most valuable of all precious stones. A ruby of five carats, if perfect in color, is said to be worth ten times as much as a diamond of the same weight. Oriental rubies are found chiefly in Burmah and Siam; inferior specimens have also occurred in North America and Australia. Spinel rubies consist of an aluminate of magnesium, and are much inferior to the true rubies in hardness and value. They are found in Burmah, Ceylon and Aus-

tralia. A lighter-colored variety, discovered in Badakshan, is known as the balas ruby.

Ruby-tail (*Chrysis ignita*), a brilliantly colored small insect, called also golden-wasp, belonging to the suborder Hymenoptera. They are sometimes called 'cuckoo-flies,' from their parasitic habit of depositing their eggs in the nests of bees and other hymenoptera.

Ruby-throat (*Trochilus colubris*), a species of hummingbird, so named from the brilliant ruby-red color of its chin and throat. In summer it is found in all parts of North America, up to 57° N. lat., being thus remarkable for its extensive distribution.

Rückert (rük'ért), Friedrich, a German poet, distinguished especially for his translations of oriental poetry, and his original poems composed in the same spirit, was born at Schweinfurt in Bavaria in 1788. After some years spent in teaching he became one of the editors of the *Morgenblatt* in Stuttgart in 1816–17. In 1826 he became professor of oriental languages at Erlangen, and in 1841 removed in the same capacity to Berlin. After his retirement in 1849 he lived on his estate near Coburg till his death in 1866. His poems are very numerous and he claims a place among the best lyrists of Germany. *Die Weisheit des Brahmanen* (6 vols. 1836–39) is among his most important Eastern works; the *Geharnischte Sonnetten* among the best known of his lyrical poems.

Rūdagī, Farid-eddin Mahommed Abdallah, the first great literary genius of modern Persia, died in 954. He was invited to the court of Samanid Nasr II bin Ahmad, ruler of Khorasan and Transoxiana, where he lived for many years, enjoying the highest honors. His didactic odes and epigrams express a sort of Epicurean philosophy, and his lyrics in praise of love and wine are rich in beauty. He survived his royal friend and died poor and forgotten.

Rudd (rud); *Leuciscus erythrophthalmus*), a fish of the carp family, having the back of an olive color; the sides and belly yellow, marked with red; the ventral and anal fins and tail of a deep-red color. It is common throughout Europe. Its average length is from 9 to 15 inches. Called also *Red-eye*.

Rudder (rud'ėr), that part of a helm or steering appliance which acts directly on the water. See *Steering*.

Rudder-fish (*Caranx Carangus*), a fish allied to the mackerel, very common in both the Atlantic and Pacific Oceans, so named from its habit of swimming around the sterns of ships, attracted, doubtless, by the refuse thrown overboard. The flesh is said to be coarse in flavor.

Ruddiman (rud'i-man), Thomas, a celebrated Scottish scholar, was born in 1674 in Boyndie parish, Banffshire, where his father was a farmer. He was graduated at Aberdeen University in 1694, and became schoolmaster at Laurencekirk. After engaging in various duties, from 1730 till 1752 he was keeper of the Advocates' Library. He had previously won recognition as one of the leading scholars of his day. His best-known work is his famous *Rudiments of the Latin Tongue* (1714), a book which immediately superseded all previous treatises of a similar kind, and long remained in use in the schools of Scotland. In 1715 he edited the first collected edition of George Buchanan's works, with severe strictures dictated by his own Jacobite leanings. He died in 1758.

Rudesheimer. See *Rhenish Wines*.

Rudolph. See *Rodolph*.

Rudolstadt (rö'dol-stat), a town in Germany, capital of the Thuringian principality of Schwarzburg-Rudolstadt, on the Saale, 20 miles s. of Weimar. It manufactures cloth, porcelain, and chemicals. The prince resides in the Heidecksburg, on an eminence overlooking the town. Pop. 12,407.

Rue (rö), a strong-scented herbaceous plant of the genus *Ruta*, nat. order Rutaceæ, a native of S. Europe,

Rue (*Ruta graveŏlens*).

but also cultivated in gardens in the United States. The root is perennial,

woody; the stems about 2 feet high; the leaves alternate, petiolate and divided; and the flowers yellow. The odor of rue is strong and penetrating, and the taste acrid and bitter. It has useful medicinal properties. This plant is an ancient emblem of remembrance from its evergreen quality. The old names 'herb-graee' or 'herb of grace' refers to this fact, or perhaps to its common use in sprinkling the people with holy water, and as a charm against witchcraft. About 20 species of rue are known.—Oil of rue is obtained by distilling garden rue (*Ruta graveŏlens*) with water; has a strong, disagreeable odor and slightly bitter taste; and is used as an ingredient in aromatic vinegar.

Ruff (ruf; *Machētes pugnax*), a bird belonging to the grallatores or waders, length, 10½ to 12½ inches; plumage, which varies greatly in color, generally variegated brown on back and wings, white on belly. In the breeding season the male has its neck surrounded by long plumes, which when raised form

Ruff (*Machētes pugnax*).

a kind of tippet or ruff, whence its name. The scientific name ('pugnacious fighter') is derived from its pugnacious habits at the same season. The females are called *reeves*. These birds nest in swamps; the eggs, three or four in number, are pale green blotched with brown. The ruffs are birds of passage, and are often killed on Long Island.

Ruffe (ruf; *Acerīna vulgāris* or *cernua*), a European fresh-water fish of the perch family. Though rarely more than 6 or 7 inches in length it is much esteemed for the table. It is sometimes called the *pope*, though the origin of this name is unknown.

Ruffed Grouse (ruft grous; *Bonāsa umbellus*), a North American species of grouse of the same family as the hazel-grouse of Europe and the pinnated-grouse or prairie-chicken of the Western prairies. It is named from the tufts of feathers on the sides of its neck, and frequents forests and thickets in the Eastern and Central United States.

Rufiji (rö-fē'ji), or LUFIJI, a river of Eastern Africa which rises to the northeast of Lake Nyassa, and enters the Indian Ocean opposite the island of Mafia.

Rugby (rug'bi), a town in Warwickshire, England, on the Avon, 15 miles N. E. of Warwick, is an important railway junction and the seat of a famous boys' school, one of the great 'public schools,' founded in 1567, of which Dr. Arnold became head-master in 1728, and had as successors Tait, afterwards archbishop of Canterbury, and Temple, bishop of London. The number of pupils is about 400. The town has some handsome churches, a town-hall, and a number of charities. Pop. (1911) 21,762.

Rugeley (röj'li), a town in Staffordshire, England, on the Trent. 7 miles northwest of Lichfield, has iron-foundries and extensive collieries. Pop. 4504.

Rügen (rü'gen), an island in the Baltic belonging to Prussia, near the coast of Pomerania; area, 377 square miles; exceedingly irregular in shape. The surface is fertile, undulating, and in many places covered with beautiful beech forests. Wheat and rape-seed are grown, large numbers of cattle and horses are raised, and the fisheries are of importance. The Stubbenkammer, a sheer chalk cliff (400 feet high) at the northeast extremity, is frequently visited. The capital is Bergen. Many of the coast villages are popular sea-bathing resorts. From 1648 till 1815 Rügen belonged to Sweden. Pop. 46,270.

Rugendas (rö'gen-dàs), GEORG PHILIPP, a German battle-painter, was born at Augsburg in 1666. He often exposed himself to great danger studying his subjects on the field. His paintings and engravings are very numerous; among the latter are six representing the siege of Augsburg, at which he was present. His compositions are spirited and unstrained; he also executed engravings in mezzotint and etchings. He died at Augsburg in 1742. His three sons are also known as engravers; and his great-great-grandson, JOHANN MORITZ RUGENDAS (1802–58), as a genre and landscape painter.

Ruhmkorff's Coil. See *Induction Coil.*

Ruhnken (rön'ken), DAVID, a German classical scholar, born 1723; died 1798. The son of rich par-

ents, he was able to devote his life to the study of the classics, especially of the Greek authors, spending most of his time after 1743 at Leyden. In 1757 he became assistant professor of Greek, and in 1761 professor of history and rhetoric at Leyden University. Ruhnken published valuable and erudite editions of Timæus' *Lexicon Vocum Platonicarum* (1754), *Velleius Paterculus* (1779), and other learned works.

Ruhr (rör), a river of Prussia, joins the Rhine at Ruhrort, about 19 miles north of Düsseldorf. It rises in Westphalia, and has a tortuous course of about 200 miles, the lower part being through the busy and prosperous Ruhr coalfield, occupied by France, 1923.

Ruhrort (rör'ort), a town of Prussia, in the government of Düsseldorf, at the confluence of the Ruhr with the Rhine, has a large harbor, and is one of the chief centers for the coal and other trade of the important industrial district of Westphalia. Pop. 12,407.

Rule Nisi (nī'si), or RULE TO SHOW CAUSE, in English and American law, an order granted by the court on an interlocutory application (formerly always *ex parte*), directing the party opposed to the applicant to do or abstain from some act, unless (*nisi*) he can *show cause* why the order should not be obeyed. If cause is shown the order is 'discharged,' otherwise it is made 'absolute,' and the party ruled must obey on pain of attachment for contempt.

Rule of the Road. See *Road*. As to the rule of the road at sea, see *Collisions*.

Rule of Three, THE, an application of the doctrine of proportion to arithmetical purposes by which we are enabled to find a fourth proportion to three given numbers, that is, a number to which the third bears the same ratio as the first does to the second. The rule is divided into two cases, *Simple* and *compound;* now frequently termed *simple* and *compound proportion*. *Simple proportion* is the equality of the ratio of two quantities to that of two other quantities. *Compound proportion* is the equality of the ratio of two quantities to another ratio, the antecedent and consequent of which are respectively the products of the antecedents and consequents of two or more ratios.

Ruling Machine, a machine for ruling very fine, accurately-spaced lines. It operates by the movement of a carriage driven by an accurately adjusted screw. If the screws have 100 threads to the inch and the carriage be stopped in a line ruled every 10th of a turn of the screw, 1000 lines will be ruled within the inch. This number may be greatly increased and it is claimed that 20,000 lines to the inch have been ruled for diffraction gratings. To rule graduations and circles and arcs a large, slowly-moving horizontal wheel is used, a diamond tracing point being arranged to descend at regular intervals and make a scratch or graduation. Still finer rulings can be made by a second rotation, in which the lines come midway between those first made.

Rum, the liquor obtained by distillation from the skimmings and the molasses formed in the manufacture of cane sugar. The pure distilled spirit is colorless, and receives its brown tint from the addition of caramel. Rum is obtained chiefly from the West Indies and British Guiana; the best sort is named Jamaica rum, no matter where manufactured. Pine-apple rum is ordinary rum flavored with sliced pine-apples; tafia is an inferior French variety of rum.

Rum, a rocky and hilly island of the Inner Hebrides in Argyleshire, Scotland, south of Skye, greatest elevation 2553 feet, is about 20 miles in circumference. Only about one-twentieth of the surface is under cultivation; the rest is surrendered to sheep and deer.

Rumania. See *Roumania*.

Rumelia (rö-mē'li-a), or RU'MILI (land of the Romans), a former political division of Turkey in Europe, comprising ancient Thrace and part of Macedonia, and including Constantinople and Salonica. See *Eastern Roumelia*.

Rumen (rö'men), the upper or first stomach of ruminants (which see).

Rumex (rö'meks), a genus of plants belonging to the nat. order Polygonaceæ, occurring chiefly in the temperate zones of both hemispheres, the species of which are known by the name of *docks* and *sorrels*. Many are troublesome weeds. Some have been used as a substitute for rhubarb-root, and others are cultivated for their pleasant acid foliage.

Rumford (rum'ford), SIR BENJAMIN THOMSON, COUNT, natural philosopher and philanthropist, was born in Woburn, Massachusetts, March 26, 1753. He was apprenticed for a time in a store at Salem, then studied medicine, and finally became a school teacher, until his marriage in 1772 with a rich widow laid the foundation of his fortune.

He espoused the British side in the American war, and became a major; and on going to England in 1776 received a government post. In 1784 he was knighted and received permission to enter the service of the Elector of Bavaria. As a minister of war and afterwards of police, he reorganized the Bavarian army, suppressed mendicity, and carried through other important social reforms. He was made count of the Holy Roman Empire in 1791, and took his title from Rumford (now Concord) in New Hampshire, his wife's home. From 1797 till 1804 he lived chiefly in England; but he afterwards settled in France, where he married the widow of Lavoisier, the chemist, from whom he soon separated. He died at Auteuil in 1814. Rumford was interested in science from an early period, and was the first to demonstrate the fact that heat is a mode of motion.

Rumford, a town and village of Oxford Co., Maine, on Androscoggin River. It has water power and manufactures of book and news paper. Pop. with Rumford Falls, 8576.

Rūmī, JALAL-UDDIN, the greatest Sufic poet of Persia, born in 1207; died in 1273. At Iconium he devoted himself to the study of mystic philosophy, founding the order of Maulawi dervishes. His works include many matchless odes and an immense collection of moral precepts in *The Spiritual Mathnawi.*

Ruminants (rö'mi-nantz), or RUMINANTIA, a group of herbivorous mammals, belonging to the great order of hoofed or ungulate mammals, included in the Artiodactyle or 'even-toed' section of these, and comprising the five families Camelidæ (camel and llama), Tragulidæ (chevrotain), Cervidæ (true deer), Camelopardalidæ (giraffe), and Bovidæ or Cavicornia (ox, sheep, goat, antelope). The faculty of rumination, though it gives name to this order, is not quite peculiar to it. (See *Rumination.*) Ruminants are distinguished from other orders by certain peculiarities of dentition. The most typical of the group, the ox, sheep, antelope, etc., have no incisor or canine teeth in the upper jaw, but have instead a hardened or callous pad against which the six lower incisors bite. In the lower jaw are two canines quite similar to the incisors, and the Camelidæ and Tragulidæ possess also upper canines. In both jaws are six grinding teeth on either side, separated by an interval from the front teeth. The feet of ruminants are cloven. Horns, developed in pairs, are present in the majority of the species; either solid, as in the antlers of the true deer, or hollow, as in the horns of the ox, etc. The alimentary canal is very long. The stomach is divided into four compartments, frequently spoken of as four stomachs. The first and largest (*rumen* or *paunch*) receives the food roughly bruised by the first mastication and transmits it to the second (*reticulum* or *honeycomb*), whence it is sent back in pellets to the mouth to be rechewed. This second mastication is called 'chewing the cud.' The food is then reswallowed into the third stomach (*psalterium. omasum,* or *manyplies*), and passes finally into the true digestive cavity (*abomasum*). Fluids may pass directly into any part of the stomach. In young ruminants, which feed upon milk, the first three 'stomachs' remain undeveloped until the animal begins to take vegetable food. Most of the ruminants are suitable for human food. They are generally gregarious, and are represented by indigenous species in all parts of the world except Australia.

Rumination (rö-mi-nā'shun), the faculty possessed by some mammals, notably ruminants (which see), of 'chewing the cud'—that is, of returning the food to the mouth from the stomach for remastication prior to final digestion. Some marsupials and certain other mammals probably share this faculty with the ruminants.

Rump Parliament, is the name by which the fagend or remainder of the Long Parliament (1640–60) was known after the expulsion of the majority of its members on Dec. 6, 1648, by Cromwell's soldiers, commanded by Colonel Pride. Only sixty members, all extreme Independents, were admitted after this Pride's Purge, as it was called; and they, with the army, brought about the condemnation of Charles I. The *Rump* was forcibly dissolved by Cromwell in 1653, for opposing the demands of the army. Twice after this it was reinstated, but both times only for a brief period, and finally, on March 16, 1660, it decreed its own dissolution.

Rum Shrub, a liquor prepared with rum, orange and lemon juice and sugar.

Runciman (run'si-man), ALEXANDER, historical painter, was born at Edinburgh in 1736. He studied in Glasgow, and in 1766 went to Rome, where he formed an acquaintance with Fuseli. Hitherto he had devoted himself to landscape without much success; but about this time he turned his attention to historical painting, in which

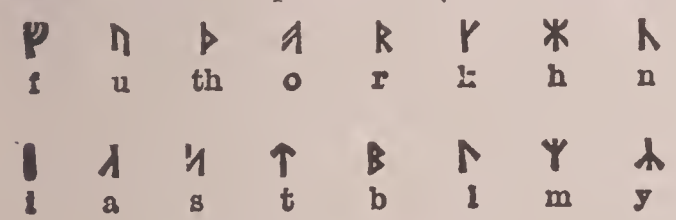
he enjoyed some reputation at Edinburgh, where he settled in 1772. His chief work was a series of frescoes from Ossian's poems, executed for Sir J. Clerk, of Penicuik. He died in 1785.—His brother JOHN (1744–66) was also a painter of considerable promise.

Runcinate (run'si-nāt), in botany, pinnatifid, with the lobes convex before and straight behind, pointing backwards, like the teeth of a double saw, as in the dandelion.

Runcorn (run'korn), an English river-port, in Cheshire, on the Mersey, 12 miles above Liverpool, has ship-building yards and various factories. It lies near the terminus of the Bridgewater Canal, from the completion of which, in 1773, the prosperity of the town may be dated. Pop. 17,354.

Runeberg (rö'ne-burg), JOHAN LUDWIG, a Swedish poet, born at Jakobstad, Finland, in 1804; died at Borgå, Finland, in 1877. In 1837 he became professor of Latin at Borgå College, where the rest of his life was spent. His works, which hold a high rank in the literature of Sweden, include the *Grave in Perrho*, a poetic romance; the *Elk Hunters*, an epic; *Hanna*, an idyllic poem; *Nadeshda*, a Russian romance; *Kung Fjalar*, a series of romances; *Ensign Stål's Stories;* several volumes of lyrics, comedies and prose essays.

Runes (rönz), the letters of the alphabets peculiar to the ancient Teutonic peoples of Northwestern Europe, found inscribed on monuments, tomb-stones, clog-calendars, bracteates, rings, weapons, etc., and only rarely and at a late period in MSS. They are formed almost invariably of straight lines, either single or in combination. Three runic alphabets (or 'futhorks,'



Norse Runic Alphabet.

as they are sometimes called from the first six letters) have hitherto been usually recognized; the Norse, with sixteen characters, the Anglo-Saxon, with forty, and the German; but modern researches have traced the common origin of these in an older primary Germanic or Teutonic futhork with twenty-four characters. The name is generally believed to be the same as A. Saxon *rûn*, a mystery, implying a magical or hieroglyphic character, which doubtless runic writings acquired when the lapse of time had rendered them unintelligible to the common people; and runic wands or staves were smooth willow-wands inscribed with runic characters, and used in incantations. The period of origin and the source of runes are not known. Scandinavian and Anglo-Saxon tradition ascribes their invention to Woden. Some have believed that the Scandinavians learned the art of writing from Phœnician merchants trading to the Baltic; Dr. Isaac Taylor recognizes in the Greek alphabet the prototype of the futhorks; while others find it in the Latin. Runic inscriptions abound in Scandinavia, Denmark, Iceland, and the parts of England once known as Northumbria, Mercia and East Anglia, but they are also found beyond these limits. Weapons and instruments, inscribed with runes, and dating from 300–400 A.D., have been dug up in Norway. The use of runes gradually disappeared under the influence of the early Christian missionaries, who proscribed them on account of their magical reputation; but in England some Christian inscriptions have been found in the runic characters. The latest runic inscriptions in Sweden date about 1450.

Runjeet Singh (run-jēt' sing), the 'Lion of the Punjab' and founder of the Sikh kingdom, was born in 1780; and died in 1839. His father, a Sikh chieftain, died in 1792, and the government fell into the hands of his mother. At the age of seventeen, however, Runjeet rebelled against his mother's authority, assumed the reins himself, and began a career of ambition. The Shah of Afghanistan granted him possession of Lahore, which had been taken from the Sikhs, and Runjeet soon subdued the small Sikh states to the north of the Sutlej. The chiefs to the south of that river invoked the protection of the British, who made an arrangement with Runjeet in 1809, both accepting the Sutlej as the south boundary of his dominions. The ambitious prince now organized his army after the European model with the help of French and English officers, and steadily extended his power, assuming the title of rajah in 1812. In 1813 he took Attock, and in the same year assisted Shah Shuja, then a refugee from Afghanistan, in return for the famous Koh-i-noor diamond. In 1818 he captured Mûltan; in 1819 he annexed Cashmere, and in 1823 the Peshawur Valley. He was now ruler of the entire Punjab, and in 1819 had already assumed the title of Maharajah, or king of kings.

In 1836 he suffered a heavy defeat from the Afghans, but he retained his power until his death. See *Punjab.*

Runnimede (run'ni-mēd), the meadow on the right bank of the Thames, now a race-course, in Surrey, England, 4 miles below Windsor, where King John met the barons who compelled him to sign Magna Charta, June 15, 1215. The actual signing is said to have taken place on Magna Charta Island opposite Runnimede.

Rupar (rö-pär'), a manufacturing and trading town of Hindustan, in Umballa district, Punjab, is situated on the Sutlej, 43 miles N. of Umballa. Pop. 10,326.

Rupee (rö-pē'), the standard silver coin of British India, the sterling value of which, nominally 2*s.*, has, owing to the depreciation of silver, of late years varied between about 1*s.* 11*d.* and 1*s.* 5*d.* A rupee equals 16 annas; ½, ¼, and ⅛ rupee are also coined in silver. 100,000 rupees are called a lac; 100 lacs, a crore.

Rupert of Bavaria (rö'pėrt), a PRINCE, distinguished as a cavalry leader in the English civil war, the third son of Frederick V, elector palatine and king of Bohemia, by Elizabeth, daughter of James I, of England, was born in 1619 at Prague. After some military experience on the Continent he went to England to assist his uncle, Charles I, and in 1642 was made general of the horse. He distinguished himself at Edgehill and Chalgrove, captured Birmingham and Lichfield in 1642, and Bristol in 1643, and displayed his courage at Marston Moor and Naseby in 1645, though his impetuosity and imprudence contributed to the disastrous results of these engagements. His feeble defense of Bristol against Fairfax involved him in temporary disgrace with Charles; but in 1648 he was made admiral of the English royalist fleet. He carried on a predatory naval war against the Parliament in European waters, until Blake forced him to escape to the West Indies, where he preyed upon English and Spanish merchantmen somewhat after the manner of a buccaneer. In 1653 he joined Charles II at Versailles. After the Restoration he was appointed lord-high-admiral, and served with Monk against the Dutch. He became governor of Windsor Castle, and died in London in 1682. Many of his latter years were devoted to scientific study, and he is credited with the invention of mezzotint engraving, which at least he introduced into England. (See also *Prince Rupert's Drops.*) He was one of the founders and the first governor of the Hudson's Bay Company. See *Rupertsland.*

Rupertsland (rö'pėrtz-land), an extensive but indeterminate region in the interior of Canada, named in honor of Prince Rupert, and transferred to the Hudson's Bay Company, of which that prince was one of the founders, by Charles II in 1670. This region is now included in Manitoba and the region surrounding, but its name still gives the title to the Bishop of Rupertsland, who resides at Winnepeg.

Rupia (rö'pi-a), a skin disease, consisting of an eruption of small flattened and distinct *bullæ* surrounded by inflamed areolæ, containing a serous, purulent, sanious, or dark bloody fluid, and followed by thick, dark-colored scabs over unhealthy ulcers. It is a chronic disease; and though not dangerous, is often very obstinate and tedious. It is not contagious.

Ruppin, NEU (noi-röp-ēn'), a manufacturing town in Prussia, province of Brandenburg, on a lake of the same name. Pop. 18,555.

Rupture. See *Hernia.*

Rural Credit Banks, a banking system established in 1916 closely following the lines adopted for the Federal Reserve Banks. They, however, do not conduct a banking system, but confine themselves to loaning funds on farm property under suitable restrictons. Borrowers give mortgages, but these run for 40 years and can be paid in small instalments. See *Federal Farm Loan Act.*

Rurik (rö'rik), the founder of the Russian monarchy, who flourished in the ninth century, is generally considered to have been a Varangian or Scandinavian, and to have led a successful invasion against the Slavs of Novgorod about 862. He was assisted by his brothers, who conquered territories to which he afterwards succeeded. He died in 879, and his family reigned in Russia till the death in 1598 of Feodor, son of Ivan the Terrible, when it was succeeded by the house of Romanoff. Many Russian families still claim a direct descent from Rurik.

Rurki (rur'kē), or ROORKEE, a manufacturing town in Saháranpur district, Northwest Provinces, Hindustan, on the Soláni, is the seat of the Ganges Canal workshops and iron-foundry, and the Thomason Civil Engineering College. Pop. about 20,000.

Rusa (rö'sa), a genus of Cervidæ, containing several species of deer, natives of the forests of India and the

Eastern Archipelago. They may be described as large stags with round antlers, having an anterior basal snag, and the top forked, but the antlers not otherwise branched. The great rusa (*R. hippelaphus*) is a native of Java, Sumatra, etc.; it has brown, rough hair, the neck in the male being covered with a mane. The sambur (*R. Aristotelis*) also belongs to this genus. It is a large and powerful animal, inhabiting the forests and mountains of North India, generally morose and savage in disposition.

Ruscus (rus'kus), a small genus of plants, nat. order Liliaceæ. See *Butcher's-broom*.

Rush, the common term for some of the different species of *Juncus*, a genus of plants, nat. order Juncaceæ. The rushes have a glumaceous perianth of six sepals, glabrous filaments, three stigmas and a three-celled many-seeded capsule. The leaves are rigid, mostly roundish, and smooth. Rushes are found chiefly in moist boggy situations in the colder climates. *Juncus effusus* is very common in the United States. The leaves are often employed to form matting and the bottoms of chairs, and the pith for the wicks of candles. The name is also given to plants of various other genera besides *Juncus*, and by no means to all species of *Juncus*.

Rush, Benjamin, a famous American physician, was born near Philadelphia, Dec. 24, 1745. In 1766 he went to Edinburgh, and took his degree of M. D. there in 1768. He began to practice at Philadelphia in 1769, becoming at the same time lecturer in chemistry at the medical school of that city. He afterwards filled the chair of the theory and practice of physic in the University of Pennsylvania. He early identified himself with the patriotic party, was one of the signers of the Declaration of Independence, and in 1787 was a member from Pennsylvania of the convention for the adoption of the federal constitution. In 1774 he was one of the founders of the first antislavery society in America. He died in 1813. Dr. Rush was a voluminous and versatile writer. His chief medical works are his *Medical Inquiries and Observations*, *Diseases of the Mind*, and *Medical Tracts*.

Rush, Richard, statesman, son of the preceding, was born at Philadelphia, Aug. 20, 1780. He was graduated at Princeton College in 1797, engaged in the legal profession, and was attorney-general of the United States under President Madison 1814–17. In 1817 he was temporary Secretary of State under President Monroe, who appointed him minister to England. He was recalled by President Adams in 1825 and made Secretary of the Treasury. In 1828 he was a candidate for Vice President on the ticket with President Adams. He was sent by President Jackson to England to get the legacy left by James Smithson for the building of the Smithsonian Institution and succeeded in obtaining the entire amount. In 1847 he was appointed minister to France and was the first ambassador to recognize the republic of 1848. He retired at the close of President Polk's term, and died July 30, 1859. He wrote *Narrative of a Residence at the Court of London, Washington in Domestic Life*, etc.

Rush, William, an American sculptor, born in Philadelphia in 1756; died, 1833. He first attracted attention by his carved figureheads for ships, notably those he designed for the frigates *Constellation* and *United States*. His full-length statue of Washington is in Independence Hall, Philadelphia.

Rushville, a city, county seat of Rush Co., Indiana, 40 miles S. E. of Indianapolis. Industries include flour and lumber mills, foundry products, furniture and wagon manufactures, etc. It is also a noted horse market. Pop. (1920) 5498.

Ruskin (rus'kin), John, art critic and political economist, and one of the most eloquent English prose writers of the last century, was born at London in Feb., 1819. He studied at Christ Church, Oxford; gained the Newdigate prize for his poem on *Salsette and Elephanta* in 1839, and was graduated in 1842. His subsequent life was the very busy, but uneventful life of a writer and teacher. In 1867 he was appointed Rede lecturer at Cambridge, and in 1870-72, 1876-78, 1883-85 he was Slade professor of fine art at Oxford, where in 1871 he gave £5000 for the endowment of a university teacher of drawing. From 1885 Mr. Ruskin lived in seclusion at his residence of Brantwood, on Coniston Lake. He was an LL.D. of Cambridge (1867), and a D.C.L. of Oxford (1871). In 1843 appeared the first volume of *Modern Painters, by a Graduate of Oxford*, in which Ruskin maintained the superiority of modern landscape painters, especially Turner, to the older masters, and at the same time advocated a complete revolution in the received conventions of art and art criticism. The subsequent volumes, of which the fifth and last appeared in 1860, expanded the subject into a most comprehensive treatise on the principles which underlie, or should underlie art, while

similar criticism was extended to another domain of art in his *Seven Lamps of Architecture* (1851), and his *Stones of Venice* (1851–53). In 1851 Ruskin appeared as a defender of pre-Raphaelitism, which had found inspiration in his words. As a political economist and social reformer he was an outspoken, uncompromising foe of what he considered the selfish and deadening doctrines of the so-called Manchester school, his chief works in this sphere being *Unto this Last* (1862), *Munera Pulveris* (1872), and *Fors Clavigera* (1871–84), a periodical series of letters to the workingmen and laborers of Great Britain. The Guild of St. George, a kind of cultured socialistic society, founded by him in 1871, with its headquarters at Sheffield, may also be taken to represent his views. His other works were very numerous and varied in subjects, among the more important of them being *Sesame and Lilies, The Ethics of the Dust, The Crown of Wild Olive, The Queen of the Air,* etc. Eloquence, force, and subtle analysis are the prevailing characteristics of Ruskin's literary style, while his works are at the same time permeated with lofty enthusiasm for truth and beauty, and with a generous sympathy for the poor and the weak. Sometimes, however, he is betrayed into exaggeration, and not unfrequently his propositions are needlessly violent and paradoxical, occasionally even contradictory. Met at the outset with keen and even bitter criticism, he nevertheless gave the impulse to a not unimportant renaissance in British art, though the new birth, is in many respects, very different from the ideal he held up. Scarcely less may be said of his work in political economy. He spent large sums instituting a kind of primitive agricultural community for the purpose of carrying out his views of social and industrial reform. It did not prove a success. He died Jan. 19, 1900.

Russell (rus'el), HOUSE OF, an ancient English family, the head of which is the Duke of Bedford, has long been conspicuous in English political history for its devotion to liberal or whig principles. It claims descent from Turstain, one of the Norse invaders of Normandy, who took possession of Rozel Castle, near Caen. His descendants, Hugh de Rozel and his brother, accompanied William the Conqueror to England, where their name assumed its present form about 1200.— JOHN RUSSELL was constable of Corfe Castle in 1221. — SIR JOHN RUSSELL was speaker of the House of Commons under Henry VI, and his grandson was created Earl of Bedford in 1550.— WILLIAM RUSSELL, the 5th earl and father of Lord William Russell (see below), was created Marquis of Tavistock and Duke of Bedford in 1694.— JOHN, 4th duke (1710–71), held office in the Newcastle and Grenville ministries, and was lord-lieutenant of Ireland in 1756–62.— FRANCIS, 5th duke (1765–1802), was distinguished for his services to agriculture.— FRANCIS, 7th duke (1788–1861), eldest brother of John, Earl Russell (see below), was summoned to the House of Lords in 1832 before the death of his father in 1839, but held no office.— Admiral Edward Russell, who defeated the French at the battle of La Hogue in 1692, was also a scion of this house.

Russell, JOHN, EARL RUSSELL, an English Liberal statesman, was the third son of the sixth duke of Bedford, was born in London in 1792; and died at Richmond in May, 1878. Educated at a private school and at Edinburgh University, he entered parliament in 1813 before attaining his majority. In 1819 he made his first motion in favor of parliamentary reform, the great question of which through life he was the champion. His influence in the Liberal

John, Earl Russell.

party steadily increased, and though temporarily unseated in 1826, owing to his advocacy of Catholic Emancipation, he carried a motion in 1828 against the Test Acts and thus led to their repeal. In 1831 he was paymaster-general in Lord Grey's administration, and though not in the cabinet introduced the first Reform Bill to the House of Commons. In the exciting struggle that followed Lord John Russell was popularly accepted as

the great champion of reform. In Lord Melbourne's second cabinet (1835–41) Russell was home secretary, and in 1839 he became colonial secretary. From 1841 till 1845 he led the opposition against Peel, with whom, however, he was in sympathy on the Corn Law question; and when Peel resigned, in 1846, Russell formed a ministry and retained power, though with a small and uncertain majority, until February, 1852. He reëntered office in December, 1852, as foreign secretary under Lord Aberdeen, and in 1855 became colonial secretary in Lord Palmerston's cabinet. He represented Great Britain at the Vienna conference, but incurred by his negotiations so much unpopularity that he resigned office in July of the same year. A period of rivalry between Lord John Russell and Palmerston now ensued, which, however, ended in 1859, when the former became foreign secretary under his old chief, by whom he was raised to the peerage in 1861. In 1865 Earl Russell succeeded Lord Palmerston in the leadership of the Liberal party, but when his new reform bill was rejected in 1866 the Liberals resigned. Thenceforward Earl Russell held no further office, though he warmly advocated all liberal measures. He was the author of numerous books and pamphlets, including lives of *Thomas Moore*, *Lord William Russell* and *Charles Fox* and *Recollections and Suggestions* (1813–73), published in 1875.

Russell, John Scott, engineer and naval architect, was born near Glasgow in 1808. After graduating at Glasgow at the age of sixteen he became a science lecturer in Edinburgh, and in 1832–33 temporarily filled the chair of natural philosophy at Edinburgh University. Next year he began his important researches into the nature of waves, which led to his discovery of the wave of translation, on which he founded the waveline system of naval construction introduced into practice in 1835. He was manager of a large ship-building yard on the Clyde for several years, and in 1844 established a yard of his own on the Thames. He was one of the earliest advocates of iron-clad men-of-war, and was joint-designer of the *Warrior*, the first English seagoing armored frigate; but the most important vessel he designed and constructed was the *Great Eastern*. One of his chief engineering works was the vast dome of the Vienna Exhibition of 1873, which had a clear span of 360 feet. He died at Ventnor in 1882. He was the author of *The Modern System of Naval Architecture* (London, 1864-65; 3 vols. folio), and other writings.

Russell, Lillian, an American actress and vocalist, noted for her beauty, born at Clinton, Iowa, in 1861; died June 5, 1922.

Russell, Lord William, an English statesman and political martyr, was the third son of the fifth Earl Russell, and was born in 1639. Entering parliament he took a leading part in politics as a leader of the Whigs, animated by a bitter distrust of the Roman Catholics and a strong love of political liberty. For a brief period in 1679 he was a member of the new privy-council appointed by Charles II to ingratiate himself with the Whigs. Resigning, however, in 1680, he rendered himself conspicuous in the efforts to exclude the king's brother, the Roman Catholic Duke of York, from the succession to the throne, but retired from public life when the Exclusion Bill was rejected. When the Ryehouse Plot was discovered in 1683 Russell was arrested on a charge of high treason, and though nothing was proved against him the law was shamefully stretched to secure his conviction. He was sentenced to death, and no efforts of his friends availed to save him. Russell met his fate with dignity and firmness. He was beheaded in Lincoln's Inn Fields, London, in July, 1683. An act was passed in 1689 (1 William and Mary) reversing his attainder.

Russell, William Clark, novelist, born of English parents at New York in 1844, his father being Henry Russell, the popular singer and composer. He went to sea at an early age, but abandoned his nautical career in 1865 and took to literature. He was connected with the newspaper press, but earned fame as the writer of sea stories, which are written with spirit and originality. Of these *The Wreck of the Grosvenor* is considered the best. Died in 1911.

Russell, Sir William Howard, war correspondent, was born near Dublin in 1821; educated at Trinity College, Dublin; called to the English bar in 1850. His connection with the *London Times* began in 1843; he was war correspondent during the Danish war of 1848, but it was his letters written from the Crimea in 1854–55 that first made him famous. He was present at Alma, Balaclava, Inkerman, and the assaults on Sebastopol, and his letters were the chief means of making public the condition of the army. He was similarly engaged during the Indian Mutiny, the American Civil war, the Prusso-Austrian war and

the Franco-German war. He accompanied the Prince of Wales to India in 1874. He was knighted in 1895. His publications comprise *The British Expedition to the Crimea, Diary in India, My Diary North and South, My Diary in the Last Great War, Prince of Wales' Tour, War with Russia*, etc. Died 1907.

Russia (rush'a), a former empire comprising one-seventh of the land surface of the globe, with an area of 8,417,118 square miles; since 1917 a 'Socialist Federal Soviet Republic.' The old Empire of Russia comprised much the greater part of Eastern Europe and of Northern Asia, and was bounded N. by the Arctic Ocean; W. by Sweden, the Gulf of Bothnia and the Baltic, Prussia, Austria, Hungary and Roumania; S. by the Black Sea, Turkey in Asia, Persia, Afghanistan and China. The population of the old empire in 1915 was 182,182,600. With the collapse of Russia in the European war, Poland and Finland (formerly integral parts of the Russian empire) proclaimed their independence, and were recognized as free states by the victor nations of the Great war. The Baltic provinces and Ukraine and Azerbaijan also asserted independence, but their status was undetermined at the beginning of 1921, at which time the Republic of Russia (exclusive of Poland and Finland, but including Esthonia, Latvia, Lithuania, Ukraine and other states whose independence had only partly been recognized) had a reduced area of 8,247,000 sq. miles, and an estimated population of 166,561,000. The new capital is Moscow.

European Russia consists almost wholly of immense plains, the Valdai Hills between Petrograd and Moscow, averaging 500 feet and never exceeding 1200 feet above sea-level, forming the only elevated region of the interior and an important watershed. The mountains of Taurida, lining the southern shores of the Crimea, have a height of about 4000 feet; the Caucasus, running from the Black Sea to the Caspian, reach the height of 18,500 feet; the Urals, stretching from the Caspian to the Arctic Ocean and separating European from Asiatic Russia, have their greatest height below 7000 feet. Beyond the Urals are the vast Siberian plains slightly inclining to the N. and becoming mountainous in some parts towards the S. and E. Part of the Thian-Shan Mountains and of the Altai Mountains, on the boundary between the Russian and Chinese Empires, belong to Siberia. (See *Siberia.*) Russia is watered by numerous and important rivers, some of great magnitude and running a course of thousands of miles. The Petchora the Mezene, Northern Dwina and Onega are the principal rivers of European Russia which send their waters to the Arctic Ocean; the Neva, Volkhoff, Soir, Narova, Velikaya, Duna, Niemen and Vistula belong to the Baltic basin; the Black Sea basin comprises the Pruth, Dniester, Dnieper and the Don; while the Caspian receives besides other rivers the Volga, the largest of all Russian rivers. Asiatic Russia has also a number of very large rivers, as the Obi, Yenisei, and Lena in Siberia, and the Amur towards the Chinese frontier. This extensive river system is of incalculable value to Russia, as by its means internal communication is largely aided. Canals connect the navigable rivers, so as to form continuous water-ways, the nearly level surface rendering them easy of construction. River steam navigation has been much developed of recent years. The lakes are also on a gigantic scale. Lake Ladoga, near Petrograd, is the largest in Europe. Other large lakes in Europe are those of Onega, Peipus and Ilmen. In Asia there is the Sea of Aral, larger than any of those mentioned, also Baikal, Balkash and others. The Caspian Sea now also forms almost a Russian lake. From the extent of the plains and steppes, the swamps, moors, desert wastes and forests of Russia, the scenery as a whole is very monotonous, its mountainous elevations occupying a comparatively small portion of its surface.

Climate and Soil.— As might be expected from its vastness this empire offers soils and climates of almost every variety. There is a polar, a cold, a temperate and a warm region; in the first vegetation is all but extinct, in the latter the vine, the olive, and even the sugar-cane grow to perfection. Extreme cold in winter and extreme heat in summer are, however, general characteristics of the Russian climate. In the cold region the thermometer varies from 80° in summer to 30° below zero in winter. The temperate zone, situated between lat. 57° and 50° N., has a mean annual temperature of from 40° to 50°, and includes within it by far the finest part of Russia. The warm region from 50° southwards is exposed to a summer heat often exceeding 100°. As regards soil, large sections of Russia are sandy, barren wastes and vast morasses. The most productive portion is that between the Baltic Sea and Gulf of Finland, and the Volga, on the N. and E.; Prussia, Poland, etc., on the W.; and the Black Sea on the S. This has, generally speaking, a soft black mold of great depth, mostly on a sandy bottom, easily wrought and very fertile. The more

RUSSIA, UKRAINE
and the
NEW BALTIC STATES
C.S. HAMMOND & CO., N.Y.
ARCTIC OCEAN
KARA SEA
Gulf of Ob
YALMAL PENINSULA
NOVA ZEMBLA
Moller B.
Black C.
Burrough or Kara Strait
VAIGACH I.
Kara Bay
KOLGUEV I.
Kanin Noss
KANIN PEN.
Cheskaia Bay
North Cape
Hammerfest
Tana
Varanger Fiord
Catherine Harbor
Kola
Alexandrovsk
Murmansk
MURMAN COAST
KOLA PENINSULA
Kandalakcha
Keret
Pulonga
WHITE SEA
Kem
Onega
Archangel
Cholmogory
Mezen
Safonova
Ust Zylma
Pustosersk
Petchora R.
Ob R.
Obdorsk
ARCTIC CIRCLE
Ussa
Kosbva
Potcherye
Kolnas
Troitzkoye
Yarensk
Velsk
Kotlas
Totma
Kertshem
Cherdyn
Kashem
Dediuchin
Obvinsk
Nizhni Tagilsk
Tagilsk
Irbit
Perm
Ekaterinburg
Ostovskaya
Votkinsk
Izhev
Sarapul
Artinsk
Slatoust
Chelliabinsk
Miyass
Troitsk
Ufa
Sterlitamak
Kanamkolski
Bugulma
Chistopol
Kasan
Kama
Orenburg
Orskaja
Ural R.
Busuluk
Samara
Syzran
Simbirsk
Saransk
Volsk
Balakovo
Atkarsk
Pokrovsk
Saratof
Yeshof
Volga
Nikolayevskaya
Tsaritsyn
INNER OR BUKEYEV KIRGHIZ HORDE (To Astrakhan)
Chernyiyar
Baskunchuk
Yenotayevsk
Astrakhan
Mouths of the Volga
CASPIAN SEA
Petrovsk
Temiskanshura
Derbent
Baku
Shemakha
Nukha
Tiflis
GEORGIA
CAUCASIA
Vladikavkas
Kutais
Poti
Batum
Alexandropol
Kars
Erivan
Elizavetpol
AZER.
Shusha
Aras R.
Lenkoran
Erzerum
Mt. Ararat
KURDISTAN
Trebizond
ARMENIA
TURKEY
Sinope
Constantinople
Bosphorus
Adrianople
BULGARIA
Varna
Constanza
Bukharest
Danube R.
RUMANIA
BLACK SEA
Pitsunda
Golovinsk
Mt. Elbruz
Caucasus Mts.
Piatigorsk
Maikop
Armavir
Ekaterinodar
Novorossisk
Theodosia
Stavropol
G. of Kama
Sea of Azof
Kertch
Ust Labinsk
Yeisk
Rostof
Azof
Taganrog
Mariupol
Berdiansk
Sevastopol
Simferopol
CRIMEA
Eupatoria
Mouths of the Danube
Odessa
Akerman
Ismail
Kishenef
Tiraspol
Bendery
Jassy
Nikolaief
Cherson
Dnieper R.
Ekaterinoslaf
Alexandrovsk
Novocherkask
Nakhichevan
Lugansk
Bachmut
UKRAINE
Kremenchug
Elizavetgrad
Balta
Soroki
Mohilef
Khotin
Kamenetz Podolsk
Proskurof
Vinnitsa
Berditchef
Zvenigorodka
Cherkasi
Poltava
Kharkof
Akhtyrka
Sumy
Bielgorod
Waluiki
Romny
Borisoglebsk
Buturlinovka
Kalach
Don
Starokonstantinov
Zhitomir
Kiev
Rovno
Nezhin
Konotop
Kursk
Voronezh
Lipetzk
Tambof
Kozlof
Pensa
Kuznetzk
Morshansk
Riashk
Ryazan
Orel
Jelets
Chernigof
Gomel
Pinsk
Pripet R.
Brest Litovsk
Kovel
Lutzk
Chelm
Lublin
POLAND
WARSAW
Lodz
Siedlce
Slonim
Bialystok
Grodno
Lomza
Plock
Suwalki
Vilna
Kovno
LITHUANIA
Memel
Libau
Windau
Mitau
Riga
LATVIA
Dunaburg
Polotsk
Vitebsk
Orsha
Minsk
Bobruisk
Mohilef
Roslavl
Smolensk
Viasma
MOSCOW
Serpukhof
Kaluga
Shisdra
Tula
Kolomna
Vladimir
Arsamas
Kovrof
Sbuia
Nizhni Novgorod
Ivanovo
Yaroslaf
Kostroma
Galitch
Vetluga
Viatka
Rybinsk
Tver
Rshev
Ostashkof
Staraia Russa
Novgorod
Pskof
Somino
Vologda
Spaskii
RUSSIA
SIBERIA
URALSK
PETROGRAD
Tsarskoye Selo
Kronstadt
Luga
L. Peipus
Dorpat
ESTHONIA
Reval
Gulf of Riga
OSEL I.
DAGOE I.
GOTLAND
BALTIC SEA
Stockholm
ALAND IS.
Helsingfors
Gulf of Finland
Viborg
Lake Ladoga
Olonetz
Petrozavodsk
Vytegra
Lake Onega
Povyenetz
Abo
Bjorneborg
Tammerfors
Vasa
Kuopio
St. Michel
GULF OF BOTHNIA
FINLAND
Uleaborg
Kajana
Tornea
Rovaniemi
Kemi
Kittila
Kemitrask
LAPLAND
Enara L.
Tornea R.
SWEDEN
Kuttno Lakes
SCALE OF MILES
0 50 100 150 200 250
Railroads
Canals

southerly portion of Siberia, as far east as the river Lena, has, for the most part, a fertile soil, and products, notwithstanding the severity of the climate, most kinds of grain.

Vegetable Products, Agriculture.— Immense forests exist, especially in the northern European provinces and the more temperate parts of Siberia, the area of the forest land in Europe being 42 per cent. of the total area. The fir, larch, alder and birch predominate. In the south, forests are less abundant, and the tracts around the Black Sea and the Caspian, and the immense steppes of the south and east, are almost wholly destitute of wood. The reckless cutting down of trees has in many parts rendered wood scarce, especially in the vicinity of great cities. Most of the forest land is now under government control, and waste is prevented. Agriculture has long been the chief pursuit of the bulk of the population. For some years it has, however, remained stationary, while manufacturing industries are steadily developing. The chief crops are rye, wheat, barley, oats, potatoes, hemp, flax and tobacco. Vine and beet culture is rapidly increasing and the breeding of cattle, horses and sheep, is also extensively carried on. Two-fifths of the land of Russia proper are held by the state, mostly forest and waste, one-fourth by landed proprietors, and about one-third by peasants.

Zoology.— Among wild animals may be mentioned the bear, the wolf, wild hog, elk, and various animals which are hunted for their furs. Wild fowl abound, particularly near the mouths of rivers. Both on the coasts and in the rivers a great number of productive fisheries are carried on. In the Arctic Ocean great numbers of seals are taken. The rivers of the Caspian, particularly the Ural and Volga, and the Sea of Azoff, are celebrated for their sturgeon. In the same quarters are also important salmon fisheries. In the regions bordering on the Arctic Ocean large herds of reindeer are kept; and in the south, among the Tartars of the Crimea and the inhabitants of the Caucasus, the camel is often seen.

Minerals.— Russia is rich in minerals. Gold, platinum, silver, copper, iron, lead, zinc, manganese, coal, salt and saltpeter all exist in abundance, and there are copious petroleum springs in the Caspian region. The precious metals are chiefly obtained in the Ural and Altai regions, the annual production averaging: gold 1,350,000 ounces; platinum, 10,000–12,000 lbs. (nearly the whole world's product); silver, 8,000 lbs. In the Ural, iron beds are rich and numerous, exceeding all others in productiveness. Copper is most abundant in the government of Perm; lead in the Ural and some parts of Poland; saltpeter in Astrakhan. Of the coal-mines those of the Don basin are the principal at present, those of Kielce ranking second; the mines around Moscow come next. The normal output is over 20,000,000 tons annually. About 60,000 tons of manganese ore are annually extracted in the Ural and the Caucasus. The petroleum wells of Baku on the Caspian rank second to the United States in output.

Manufactures.—Following the revolution of 1917 and the socialization of the country under the Bolsheviki government, the manufacturing interests suffered severely. Prior to the accession of Peter the Great, Russia had no manufactories; he started them, and under the more or less fostering care of his successors they steadily grew. Especially in the years following 1865, down to the opening of the Great war of 1914-18, a great number of industries developed, this being mainly due to Russia's protective policy. The overthrow of the monarchy and the adoption of socialism antagonized business men who believed in individualism and it was difficult to persuade them to work for the state, even at large salaries. The establishment of a blockade by France, Great Britain and the other victor nations aided in the demoralization of industry. The principal products include spirits (now prohibited), sugar, cotton, linen, yarn, thread, iron products, paper, etc..

Trade.— The bulk of Russia's external trade is carried on through the European frontier, and the Baltic and Black Sea ports. The chief exports are: grain (about one-half of entire exports), flax, linseed and other oleaginous seeds, timber, hemp, wool, butter and eggs, spirits, bristles and furs, in the order indicated. The chief imports are cotton, wool, tea, machinery, coal and coke, cotton yarn, metal goods, wine, olive-oil, raw silk, herrings, textile goods, fruit, coffee, tobacco. The import trade is heaviest with Germany, Great Britain, China, United States, in order named. In the export trade Great Britain takes the lead, Germany, the Netherlands, France, Austria, Hungary following. The value of the annual commerce is about $1,300,000,000. The development of the vast natural resources and trade of Russia is prevented by transport difficulties. The magnificent river and canal system is not available for a good part of the year, and railways are comparatively limited. In 1910 there were about 50,000 miles of railway in operation in the Russian Empire, in-

cluding Europe, Siberia and Turkestan. Chief among the recent undertakings is the great Siberian railway, from Tomsk to Vladivostok, with branches to important centers. Another important Asiatic line is the Transcaspian railway, from Michailovsk, on the southern shore of the Caspian, to Samarcand via Bokhara. The latter, while intended as a military line, has largely stimulated trade in the heart of Asia. There are over 120,000 miles of telegraph, nearly all owned by the state. Trade is further assisted by immense fairs, which are much frequented by European and Asiatic merchants. The principal is that of Nijni-Novgorod, with an annual product of $150,000,000. Russia in Europe has more than a dozen cities with a population exceeding 100,000, the largest being Petrograd, Moscow, Odessa, Riga, Kharkoff, Kieff, Saratov. Petrograd and Moscow are the two capitals of the empire. The leading ports are Archangel and Onega on the White Sea; Cronstadt, Petrograd and Reval on the Gulf of Finland; Riga on the Gulf of Riga; Libau on the Baltic; Odessa and Nicolaieff on the Black Sea; Kertch in the Crimea; Taganrog on the Sea of Azoff; and Astrakhan, Baku, and Kizliar on the Caspian. The silver rouble, containing 278 grains of fine silver, is the money unit, value about 58 cents. It is divided into 100 kopecks.

Government, etc.—Prior to the establishment of the republic in 1917 Russia was an absolute monarchy, the emperor (czar or tsar) being the supreme ruler and legislator, and the final tribunal in all matters political or ecclesiastical. His title was Emperor and Autocrat of all the Russias, Czar of Poland and Grand-prince of Finland. In August, 1905, as a result of the revolutionary spirit of the people, an elective legislature was granted, known as the Duma and consisting of members elected for five years, and representing the provinces and the greater cities. A second legislative body was the Council of the Empire, half of whose members were elected, half nominated by the emperor. These two bodies had equal legislative powers. Laws passed by them had to receive the sanction of the emperor, but no law could come into effect without the approval of the Duma. In its operation, however, the Duma was made subservient to the autocracy. The administration of the empire was entrusted to great boards or councils, including the Committee of Ministers, the Council of Ministers, the Senate—a Superior Court of Appeal—and the Holy Synod, a body of high-church dignitaries. The president of the committee and the Council of Ministers ranked with the premiers of other countries. Finland (now a separate state) had a national parliament, at first consisting of four estates, later consisting of one elective Chamber, every Finnish citizen (man or woman) possessing the suffrage. Some of the Baltic provinces also possessed certain privileges, but these were gradually curtailed.

According to the constitution adopted by the All-Russian Soviet Congress in July, 1918, Russia is declared to be 'a Republic of Soviets of Workers', Soldiers' and Peasants' Delegates;' and all central and local authority is vested in these Soviets. The state owns all factories, mines, railways, lands, etc. The highest authority is the All-Russian Congress, consisting of representatives of town Soviets on the basis of one delegate for every 25,000 electors, and of Provincial Congresses of Soviets on the basis of one delegate for every 125,000 inhabitants. This All-Russian Congress elects in turn a Central Executive Committee of 200 members; and the Committee elects a President and a Council of People's Commissioners, the latter being equivalent to a cabinet. All citizens, over 18 years, irrespective of sex, religion, nationality, or residence, who 'earn their livelihood by productive labor,' and all soldiers and sailors in the Soviet army and navy are permitted to vote. There are Local Soviets for the administration of government in villages, etc.

Army and Navy.—Russia, at the beginning of the war, had one of the most powerful armies in the world; peace footing, 1,200,000; war strength 4,500,000. After the revolution of 1917 the army disintegrated. A 'Workmen's and Peasants'' Red Army of Volunteers was formed in 1918. This grew in strength and defeated Kolchak, Denikin and other anti-Bolshevik forces in 1919 and 1920. The strength of the navy was greatly reduced, and what ships remain in Russian hands were, for the most part, inactive in 1920.

Religion and Education.—The prevailing religion of the country is the Eastern or Greek Church, officially called the Orthodox Faith. It has its own independent Synod, but maintains the relations of a sister church with the four Orthodox patriarchates of Constantinople, Alexandria, Antioch and Jerusalem. The Holy Synod, the board of government of the Russian church, was established in 1721; to it was committed the superintendence of the religious affairs of the Empire. This was formerly the established religion of Russia, and one of the fundamental laws of the state was that the emperor must belong to that church. The church was disestablished by the Soviet government, and

declaration was made that all religions might be freely professed in the republic. The next largest church is the Roman Catholic; there are also Lutherans, Mohammedans, Jews and others. Elementary education in Russia is but poorly developed. Under the Czarist régime but 27 out of every 100 persons up to nine years of age were able to read and write, in some districts but 2.3 per cent of the population received primary education. The Soviet government secularized all schools and educational establishments and embarked upon a scheme to provide public schools, with compulsory attendance. There are universities at Petrograd, Moscow, Kharkov, Kieff, and elsewhere, and newly established Bolshevist universities at Veronesh and Yalta.

People.—As regards language (and so far also race) the peoples of Russia are comprised under the two great divisions of Aryans and Mongolians; the former include Slavonians, Germans and Greeks, the latter the Finnish and Tartar races. Prior to the year 1861 the mass of the people were serfs subject to the proprietors of the soil. The emperors Alexander I and Nicholas took some initial steps towards the emancipation of this class; but a bold and complete scheme of emancipation was begun and carried out by Alexander II in 1861.

Language.—A number of languages and a considerable variety of dialects are naturally spoken in a country comprising such a heterogeneous population, but the Russian is the vernacular of at least four-fifths of the inhabitants, the literary and official language being specifically the 'Great Russian,' or that belonging to Central Russia surrounding Moscow. It is one of the Slavonic family of the Aryan or Indo-European languages, and as such is a sister of Greek, Latin, Sanskrit, German, English, etc. (See *Philology.*) Modern Russian has been much modified by the introduction of Greek, Tartar and Mongolian terms. It has an alphabet of thirty-seven letters, a written and printed character of a peculiar form (see *Cyrillian Letters*), and a pronunciation which it is hardly possible for any but natives to master. Its flexions are both numerous and irregular; but it is soft, sonorous, remarkable for its copiousness, and affords unbounded facility for rhyme.

Literature.—The introduction of Christianity in 988 first created a taste for letters among the ancient Slavonians, but the chief remains of that early literature are some fragments of traditionary tales in rhythmic verse, which have recently excited much attention on account of their similarity to the English, Spanish and Scandinavian ballads. Among the earliest works reduced to writing is a book of the Gospels dating from 1056 or 1057. The Tartar invasion arrested the progress of literature, and Russia fell back into barbarism, whence she only emerged again after the accession of the house of Romanoff (see below). The revival of literature was at first confined to some crude and feeble dramatic performances, and towards the close of the seventeenth and the beginning of the eighteenth centuries, to poor imitations of French, German and other foreign works. Lomonosof (1711–65) wrote a number of works both in prose and verse, and by his precepts and example did much to originate a national literature, and to fix the grammar of the language. His contemporary, Sumarokoff, carried the drama to a high degree of perfection; Derzhawin (1743–1816) distinguished himself highly in lyrical and other poetry; and since then many writers have distinguished themselves in all departments. It is, however, principally to Karamsin (1725–1826) that Russia owes the more general spread of literary taste. The foundation of the Russian Academy in 1783, and the issue of its great dictionary, also contributed largely towards it. The same perfection which Karamsin gave to prose, Dimitrieff gave to poetry. Of the more modern authors particular mention is due to Alexander Pushkin, Russia's greatest poet, and Michael Lermontoff, not far his inferior. The most eminent novelists are Nicholas Gogol, Ivan Turgenieff, Feodor Michailovitch, Dostoieffsky, Alexander Herzen and Count Leo Tolstoi, the last the greatest of the fiction writers of Russia. Russia possesses a number of valuable libraries. The first Russian press was set up at Moscow in 1554.

History.—The origin of the Russian empire is involved in much obscurity, but it is usually regarded as having been founded by Rurik, a Scandinavian (Varangian), about 826, his dominions and those of his immediate successors comprising Novgorod, Kieff, and the surrounding country. Vladimir the Great (980–1015), the Charlemagne of Russia, introduced Christianity, and founded several cities and schools. But from this period down to 1237, when the country was overrun by the Tartars, Russia was almost constantly the scene of civil war. For more than two centuries Russia continued subject to the Tartars, while on its opposite frontier it was exposed to the attacks of the Poles and Teutonic knights. In 1328 the seat of

government was transferred from Novgorod to Moscow; and in 1481 the Tartars were finally expelled under Ivan the Great (1462–1505). Ivan extended the Russian dominions, married the niece of the last Byzantine emperor, and ever since the rulers of Russia have looked with longing eyes upon the territories of which the Byzantine empire consisted. Ivan the Terrible (1533–84) did much to extend and consolidate the Russian territory, and in particular began the conquest of Siberia, which was completed in 1699. In 1613 the house of Romanoff, whence the present czar is descended, was raised to the throne, and from this period the empire gained greater strength and consistency. Under Alexis Mikhailovitch (1645–76) White Russia and Little Russia were conquered from the Poles, and the Cossacks of the Ukraine acknowledged the supremacy of the czar; various internal improvements were effected, and the power of Russia began to be felt and feared by all her neighbors. But Russia's real greatness may be said to date from the accession in 1696 of Peter the Great, who first secured the country the attention of the more civilized nations of Europe. His first military achievement was his conquest of Azoff from the Turks in 1699, which, however, he lost again in 1711. He also completed the conquest of Siberia; and, what was of equal importance, obtained from Sweden by the Peace of Nystadt in 1721 Livonia, Esthonia, Ingria, or part of Karelia, the territory of Viborg, Oesel and all the other islands in the Baltic from Courland to Viborg. Catharine I, widow of Peter I, succeeded on the death of the latter, but died after a reign of only two years. The throne was then occupied successively by Peter II, 1727–30; by Anna, 1730–40; by Ivan VI, 1740–41; by Elizabeth, 1741–62; by Peter III, about six months in 1762; by Catharine II, one of the ablest of its rulers, 1762–96; by Paul, 1796–1801; by Alexander I, 1801–25; by Nicholas, 1825–55; by Alexander II, 1855–81; by Alexander III, 1881–94; by Nicholas II, since 1894. During all these reigns the growth of the empire was continuous. The Kirghiz Cossacks were subdued in 1731, the Ossetes in 1742; the Finnish province of Kymenegard was gained by the Treaty of Abo in 1743. The three partitions of Poland took place under Catharine II in 1772, 1793, and 1795. Russia acquired nearly two-thirds of this once powerful country. By the Peace of Kutchuk-Kainarji, in 1774, the Turks gave up Azoff, part of the Crimea (the other part was taken possession of in 1783), and Kabardah; and by the Peace of Jassy, in 1792, Oczakov, Georgia also came under the protection of Russia in 1783, and Courland was incorporated in 1795. A portion of Persian territory had already been acquired; and in 1801 the formal annexation of Georgia was effected. The peace of Frederickshaven, 1809, robbed Sweden of the whole of Finland, which now passed to Russia; the Peace of Bukarest, 1812, took Bessarabia from the Turks; that of Tiflis, 1813, deprived the Persians of parts of the Caucasus; and then the Vienna Congress of 1815 gave the remainder of Poland to Russia. After fresh wars the Persians lost the provinces of Erivan and Nakhichevan in 1828; and the Turks lost Anapa, Poti, Akhalzik, etc., by the Peace of Adrianople in 1829. The desire to possess further dominions of the Sultan led to a war against Turkey in 1853, in which England, France and Sardinia also took part in 1854, and which ended in the Peace of Paris, 1856. (See *Crimean War.*) The Russians were compelled to restore to Moldavia the left bank of the Danube in Bessarabia. This district, however, was again restored to Russia by the Congress of Berlin in 1878, which followed the Russo-Turkish war of 1877–78. (See *Ottoman Empire.*) In 1858 Russia acquired by agreement with China the sparsely populated but widely extended district of the Amur; the subjection of Caucasia was accomplished in 1859 and 1864, and considerable conquests were made after 1866 both in Turkestan and the rest of Central Asia. A ukase of 1868 annihilated the last remains of the independence of Poland by incorporating it completely in the czardom. On the other hand, Russian America was sold to the United States in 1867. The following table will show at a glance the extent of these continuous accessions of territory: —

The extent of Russian territory under—			
Ivan the Great,	1462,	about	382,716 sq. m.
Vassili Ivanovitch,	1505	"	510,288 "
Ivan the Terrible,	1584	"	1,530,864 "
Alexis Michaelovitch,	1650	"	5,039,094 "
Peter I,	1689	"	5,953,360 "
Anna,	1730	"	6,888,888 "
Katharine II,	1775	"	7,122,770 "
Alexander II,	1868	"	7,866,940 "
Do.,	1881	"	8,325,393 "
Alexander III,	1892	"	8,644,100 "
Nicholas II,	1902	"	8,650,000 "

In the latter part of the nineteenth century a great disturbing element to the government of Russia sprang up in Nihilism (see *Nihilists*). Alexander II

was killed by their agency, and attempts were made to murder the succeeding emperor. Within the present century the activity of the Nihilists has abated. Since the advent of the twentieth century events of great importance have taken place in Russia. Among those of internal moment may be named the oppressive measures against the Jews. Finland also suffered from oppressive measures aimed against the partial independence in government which Russia had pledged to observe. Externally the great event was the war of 1904–05 between Russia and Japan. The former persisted in occupying Manchuria after the Boxer outbreak (see *China, War in*), despite treaty obligations with China and the protests of Japan. The latter, fearing aggressive movements against its own territory, declared war against Russia on Feb. 6, 1904. This war was prosecuted with unexpected vigor and military skill on the part of the Japanese, the Russians being defeated in every engagement, their stronghold of Port Arthur taken, their fleet completely destroyed, and their army driven back from point to point in Manchuria. Their case seemed almost hopeless when, in June, 1905, President Roosevelt offered the services of the United States in bringing about a peace between the combatants. This offer was accepted, a peace conference between the two powers was held at Portsmouth, New Hampshire, and a treaty of peace signed on September 6, 1905. The terms of the treaty were highly favorable to Japan, the power and influence of which nation were greatly increased, while the influential position of Russia in Eastern Asia largely ceased to exist and its expansion in that quarter was checked. Manchuria was restored to China, Russia being left the simple right of railway traffic across its northern section. The result of this war led to momentous events in European Russia, a great revolutionary outbreak taking place. The people were temporarily pacified by the granting of a representative parliament. The crown, however, failed to keep full faith with them, gradually restricting the franchise, till in a few years the parliament ceased to be representative of the people at large. While the government yielded the law-making power to the Duma, no law held good without the Czar's assent. With the beginning of difficulties between Austria and Servia, in 1914, Russia announced that it would not permit Austria-Hungary to make war on Servia without good reason and ordered a mobilization of troops. Germany demanded that Russia suspend mobilization, and when this was not done, declared war. See *European War*. In March, 1917, an almost bloodless revolution, beginning in Petrograd and spreading immediately to other large cities, caused the overthrow of the ruling dynasty, the Czar abdicating on behalf of himself and the heir apparent at midnight of March 15. A provisional government was established, with Prince Lvoff as President of the Council, and Paul Milyukoff as Foreign Secretary. A number of reforms were announced, and the United States, Great Britain and France and Italy hastened to recognize the new government. But a desire for peace had grown in the country, and the Council of the Workmen's and Soldiers' Delegates met in defiance of the government and demanded that an international peace conference be held. This council was permitted to meddle with the military forces, and Milyukoff resigned in disgust. The war minister was replaced by A. F. Kerensky, the only Socialist in the Cabinet, who became the leader of Russia in July, when Prince Lvoff resigned as Prime Minister. For a time the Workmen's Council worked harmoniously with Kerensky, but his declaration of a promised policy of 'blood and iron,' proclaimed at Moscow August 26, was greeted by a general strike. Meantime the extreme wing of the Socialist party, known as the Maximalists, or Bolsheviki, was growing in power under the leadership of Lenine, a Russian revolutionist whose true name was Vladimir Ulianoff, and his second in command, Trotzky, otherwise known as Lieber Bronstein or Braunstein. They demanded recognition in the coalition cabinet, but Kerensky ignored them.

The military situation was growing worse all the time; on July 24 the Kaiser, the Austrian emperor and Field Marshal Mackensen had made a pompous entry into Tarnopol; Stanislaus was abandoned on July 25; Kolomea a day or two later; on August 3 the Germans entered Czernowitz, and sections of the Russian army were deserting en masse. General Korniloff pleaded in vain for an end of 'the terrible evil of disorganization' which, he declared, was 'destroying the army.' There was a temporary stiffening of resolve when it became known that the Germans, under General Von Below, were moving on Riga. The advance began on September 1, after a violent bombardment, and the Dwina was crossed at Uxkull, 18 miles above Riga. The German navy participated in the new offensive, and on September 3 the famous port of Riga was in German hands. Here, also, the Kaiser made a state entry and re-

viewed his victorious troops, congratulating them on a success that had been bought from traitors.

This disaster did not waken the revolutionists from their dreams. On September 7 General Korniloff proposed to have himself appointed dictator, with Kerensky's approval. Kerensky promptly denounced Korniloff and ordered his arrest. General Kaledines, hetman of the Cossacks, had intended to join General Korniloff in a march on Petrograd, but the march collapsed without bloodshed. On September 14 Russia was proclaimed a republic by the provisional government, Kerensky being premier of a cabinet of five members. The Soviet had proclaimed the right of all nationalities to govern themselves, and the break up of Great Russia promptly began. The great province of Finland declared its independence, as did the Ukraine. Lithuania agitated for self-government. Esthonia, Livonia and White Russia followed suit. Bessarabia, in the southwest, set up a parliament of its own. The Tartars in the Crimea convened a Tartar Congress. The Cossacks formed a loose federation. The Mohammedan tribes of the Northern Caucasus and Transcaucasia; the peoples of Siberia on the Amur River; on the Transcaspian territories and elsewhere, set up forms of independent government. Disorder was perpetual; landowners were dispossessed; machinery was wrecked. Early in October the German Baltic fleet captured Oesel Island at the mouth of the Gulf of Riga; one or two Russian ships were sent to the bottom in Moon Sound and Dago and other islands were taken, with 15,000 prisoners. Kerensky petulantly asked, 'Where is the British Navy?' Disturbances broke out afresh in Petrograd. Lenine instructed the troops to disregard all orders except those given through the Soviet committee which he controlled. The only force that could be trusted to protect the Winter Palace, where Kerensky lived, was a detachment of the Battalion of Death, some 200 women from the woman's battalion. Kerensky appealed for support, but he saw the end had come, and on November 7 he disappeared in disguise to Bykoff on the railway to Kiev. He managed to make his escape from Russia, and visiting London and other places he endeavored to secure help in arresting the progress of Bolshevism.

His supporters attempted a stand against Lenine, who had now taken the reins of government, but the counter-rebellion was speedily vanquished, and Lenine and his Bolshevik followers were supreme in Petrograd and Moscow. Trotzky, the new Foreign Minister, issued a note, which was virtually an ultimatum, on November 20, calling on the Allies to make peace, with the threat that if they had not done so by November 23, Russia would hold herself free to act alone. The Allies protested, but Russia had resolved upon peace, and Lenine was determined to obtain it at any price. On December 1 a cessation of hostilities was arranged on the northern and Gallician fronts, and the preliminary peace parley began in Brest-Litovsk on December 5, in the presence of German, Austrian, Turkish and Bulgarian representatives. An armistice was agreed upon, and negotiations were continued. Trotzky protested against the severity of the German peace terms, and while the delegates debated, the armistice was extended till February 18, 1918. Meantime, on February 9, peace was signed between Germany and the newly declared republic of Ukraine, a state of between 200,000 and 300,000 square miles, with a population of thirty or forty millions. The Ukrainian peace was followed by a cryptic message from the Russian Bolsheviki, dated February 10, stating that they 'refused to sign a peace which would bring with it sadness, oppression and suffering to millions of workmen and peasants . . . . but we also cannot and must not continue a war which was begun by czars and capitalists. . . . . Russia declares the war with Germany, Austria-Hungary, Turkey and Bulgaria at an end. Simultaneously the Russian troops have received the order for demobilization on all fronts.'

This did not satisfy the Germans, who failed to understand how there could be neither peace nor war. If the Russians wanted peace they must sign the treaty; if not, war would be resumed. Acting upon this declaration German troops advanced on February 18 along the whole northern Russian front, crossing the Dwina and taking Dvinsk, while disorganized forces fled before them, abandoning guns by the thousand, rolling stock, thousands of motor cars, rubber and copper which the Allies had placed in Russian hands. On February 24 Lenine declared in the Soviet, 'Their knees are on our chest; our position is hopeless. This peace must be accepted.' While action of the government was still delayed, the Germans continued their resistless march. They were in Reval, the great Baltic base of the Russian navy; they were in the important railway junction of Pskoff, only eight hours from Petrograd. They were in Finland. The Aland Islands in the Baltic had been seized. Simultaneously the Turks were pressing on in Armenia. Trebizond was reoccupied, Erzerum, Kars

INSERT

RUSSIA AS PARTITIONED BY THE TREATY BETWEEN THE GERMANS AND THE BOLSHEVIKI SIGNED AT BREST LITOVSK. MARCH 14. 1918

and the whole Caucasian coast were open and unguarded. Negotiations again began with the German war lords, and a peace treaty was finally signed on March 3, 1918, and ratified by a vote of 453 to 30 by the All-Russian Congress of Soviets, meeting at Moscow March 14.

The *first* clause of the treaty declares the state of war between the Central Powers and Russia ended. The *second* deals with the civil populations in occupied regions. The *third* agrees to a new frontier line to be settled by a commission. In the *fourth* Russia undertakes the evacuation of the Anatolian provinces and their return to Turkey. The *fifth* provides for the demobilization of the Russian army. The sixth, seventh, eighth and ninth clauses are as follows:

Sixth. Russia undertakes immediately to conclude peace with the Ukraine People's Republic and to recognize the peace treaty between this state and the Powers of the Quadruple Alliance. Ukrainian territory will be immediately evacuated by the Russian troops and the Bolshevik guard. Russia will cease all agitation or propaganda against the government or the public institutions of the Ukrainian People's Republic.

Esthonia and Livonia will likewise be evacuated without delay by the Russian troops and the Bolshevik guard.

The eastern frontier of Esthonia follows in general the line of the Narova River. The eastern frontier of Livonia runs in general through Peipus Lake and Pskov Lake to the southwesterly corner of the latter, then over Lubahner (Lubau) Lake in the direction of Lievenhof, on the Dvina.

Esthonia and Livonia will be occupied by a German police force until security is guaranteed by their own national institutions and order in the state is restored. Russia will forthwith release all arrested or deported inhabitants of Esthonia and Livonia and guarantee the safe return of deported Esthonians and Livonians.

Finland and the Aland Islands will also forthwith be evacuated by the Russian troops and the Bolshevik guard and Finnish ports by the Russian fleet and Russian naval forces.

So long as the ice excludes the bringing of Russian warships to Russian ports only small detachments will remain behind on the warships. Russia is to cease all agitation or propaganda against the government or the public institutions in Finland.

Other clauses provided for the recognition of the free states of Persia and Afghanistan; for the return of prisoners of war; and in the ninth clause the contracting parties mutually renounced indemnification of war costs.

This treaty of peace, which was signed at Brest-Litovsk in 1918, was specifically renounced by Germany in the treaty of peace with the Allies concluded at Versailles in June, 1919. By the latter treaty Russia was deprived of her former Polish territory (see *Poland*) and Finland was made a separate state. The Baltic states, Esthonia, Latvia, and Lithuania, asserted their independence, as did Ukraine, Georgia, Azerbaijan and other peoples formerly included in the empire.

The year 1920 was marked by the successive collapse of three military movements to oust the Bolshevik government, those of Admiral Kolchak, who was killed February 7, Denikin and Wrangel. During the summer the Poles disregarded the frontier lines drawn by the peace commissioners and pushed into Russia. They were driven back by Bolshevik forces, who threatened to occupy Warsaw. In their extremity France came to the rescue, and sent General Weygand, who started a counter offensive August 17, which not only stopped the Bolshevik invaders but drove them back. An armistice was later agreed to at Riga, and a peace treaty signed, both sides compromising as to the new Polish frontier. In 1921 a great famine occurred in Soviet Russia, causing acute distress, particularly in the Volga basin, where 12,000,000 people were reported to be starving. The United States and other countries rushed aid to the stricken district.

Rust, the reddish-brown or orange-colored substance which forms on iron or steel exposed to a moist atmosphere, a hydrated ferric oxide.

Rust, a disease which attacks cereals and many pasture grasses. It is most common on the leaves, on which it is visible in the form of orange-colored mealy spots, but is by no means confined to them. Rust may be prevented or the loss greatly reduced by thorough and repeated spraying with fungicide.

Rustchuk (rös'chök), a town of Bulgaria, situated on the right bank of the Danube, where that river is joined by the Lom. Pop. 33,632.

Rust-mite, one of certain mites of the family *Phytopidæ*, or gall-mites, which do not produce galls, properly speaking, but live in a rust-like substance which they produce upon the leaves or fruit of certain plants. Many of these rusts are characterized as rust-fungi.

Rutabaga (rö-ta-bág'a), a name for the Swedish turnip. See *Turnip*.

Rutaceæ (rö-tā′se-ē), a nat. order of polypetalous exogens. They are shrubs or trees, rarely herbs, the simple or compound leaves dotted with glands, often having a strong heavy smell. About 700 species are known, occurring most abundantly in Australia and South Africa. A South American species produces the Angostura-bark. The bark of a Brazilian species, the *Ticorĕa febrifūga*, is a powerful medicine in intermittent fevers. The species known as dittany abounds in volatile oil and diffuses a powerful fragrance. It exhales so much oil in dry, hot weather that a slight flash takes place when a candle is brought near it.

Rutgers College, an institution for higher education at New Brunswick, New Jersey, founded as Queen's College in 1766. In 1825 the name was changed to Rutgers College in honor of Henry Rutgers (1745-1830), a New York soldier and philanthropist. It has an endowment of about $750,000. In 1920-21 there were 1386 students.

Ruth, Book of, a canonical book of the Old Testament. It is a kind of appendix to the Book of Judges, and an introduction to those of Samuel, and is therefore properly placed between them. The story of Ruth records in simple language the ancient rights of kindred, redemption, and other interesting customs of Hebrew antiquity. The date of the history and the name of its writer are unknown, but is probably of a date subsequent to the captivity.

Ruthenians (rö-thē′ni-anz), Russin'ians, Russniaks, Red or Little Russians, numerous Slavonic tribes inhabiting Eastern Galicia, Bukowina and Southeast Poland, closely allied to the inhabitants of Podolia and Volhynia. The number of Ruthenians is estimated at 4,500,000.

Ruthenium (rö-thē′ni-um), a metal occurring in platinum ore, Symbol Ru; atomic weight, 101.7; specific gravity, 11 to 11.4; color, whitish-gray. It is very infusible, and forms a series of salts which are analogous to those of platinum.

Rutherford, a borough of Bergen Co., New Jersey, 7 miles s. s. e. of Paterson. It is a place of residence for New York merchants, and has some manufactures. Pop. 9497.

Rutherford (ruth′ėr-ford), or Rutherfurd, Samuel, a Scottish divine, was born about the year 1600 in Roxburghshire; died at St. Andrews in 1661. He studied at Edinburgh University, and in 1627 was appointed minister of Anwoth in Kirkcudbright. On account of his strong Presbyterian views he was deprived of his living in 1636 and imprisoned for two years, when he was restored. He took a prominent part in the drawing up of the National Covenant. In 1639 he became professor of divinity, and in 1649 principal of the new college, St. Andrews. He published numerous politico-theological treatises. The most famous of these is *Lex Rex*, which on the Restoration was publicly burned, and he himself charged with high treason. Death prevented him from answering the charge before parliament. His *Familiar Letters*, published after his death, have been frequently reprinted.

Rutherglen (ruth′er-glen), commonly called Ruglen, a burgh of Scotland, county of Lanark, 2 miles southeast of Glasgow, on the left bank of the Clyde. It consists chiefly of one wide street, on which stands a fine baronial structure, the municipal buildings and town-hall. There are chemical works and dye-works, a paper-mill, a pottery, a building-yard for small steamers; and in the vicinity coal-mines. Rutherglen was erected into a royal burgh by David I about 1126. Pop. (1921) 24,744.

Ruthin (ruth′in), Rhuddin, or Rhuthyn, a borough in North Wales, on the Clwyd, in the county of Denbigh. Near it are the remains of a magnificent old castle called Rhyddin, or Red Fortress. Pop. 2824.

Ruthven (ruth′ven), Raid of, in Scottish history, an act of treachery by which the Earl of Gowrie and his party, on the 22d of August, 1582, secured themselves for ten months the control over the person and power of James VI. The king, then only sixteen years of age, was surrounded at Ruthven Castle, the seat of the Earl of Gowrie, where he had gone on a hunting expedition. He was set free by the opposition party at St. Andrews (June 29, 1583), and the Earl of Gowrie was beheaded.

Rutile (rö′tīl), red oxide of titanium, a brown, red, yellow, and sometimes nearly velvet-black ore. It is found in many European countries, in North America, and the Urals, chiefly in the veins of primitive rocks. It is infusible before the blow-pipe without a flux. Potters have used the metal to give a yellow color to porcelain.

Rutland (rut′land), or Rutlandshire, the smallest of the English counties, surrounded by the counties of Lincoln, Leicester, and Northampton; area, 152 sq. miles. The surface is beautifully diversified by gently-rising hills. The soil is almost every-

where loamy and rich. The west part of the county is under grass, and the east chiefly in tillage. It is famous for its sheep, wheat, and cheese, much of the latter being sold in Stilton. Pop. (1911) 20,347.

Rutland, a city, county seat of Rutland County, Vermont, on Otter Creek, 67 miles S. by E. of Burlington. There are fine quarries of marble in the vicinity, the trade including about three-fourths of the marble mined in the United States. There are manufactures of scales, stone-working machinery, marble monuments, building marble, etc. Pop. (1920) 14,954.

Ruvo di Puglia (pul'yà), a town in S. Italy, province Bari, with a handsome cathedral and manufactures of pottery. Pop. 23,776.

Ruysdaal (rois'däl), or RUYSDAEL, JACOB VAN, one of the most distinguished Dutch landscape-painters, born at Haarlem probably about 1628; died in the poorhouse of his native place 1682. His paintings, but little appreciated during his lifetime, now bring great prices. Fine examples of his works are to be seen in the National Gallery at London, and in the Louvre at Paris. Landscapes with dark clouds hanging over them, lakes and rivulets surrounded by overhanging trees, etc., are his subjects, and are represented with true poetic feeling and admirable technique. The subjects of certain of his mountain pictures seem to be taken from Norway. It is said that the figures in his paintings were executed by A. van de Velde, Philip and Pieter Wouwerman, C. Berghem and others.

Ruyter (roi'ter), MICHIEL ADRIAANSZOON DE, a celebrated Dutch admiral, born at Flushing in 1607; died in 1676 in the port of Syracuse from a wound received in an engagement with the French. He rose to his rank from the situation of cabin-boy, and distinguished himself for remarkable seamanship and bravery in many naval battles, but more especially in 1653, in 1666 and in 1672, against the British fleet.

Ryan (rī'an), PATRICK JOHN, Roman Catholic archbishop, was born near Thurles, Ireland, in 1831. He was ordained deacon in 1853, completing his studies in St. Louis, Missouri, and raised to the priesthood in 1854. In 1872 he was elected coadjutor archbishop of St. Louis. His administration was energetic and successful. He was nominated archbishop of Philadelphia in 1884, a post which he filled with much ability. He died in 1911.

Rybinsk (rī-bensk'), or RUBINSK, a town in Russia, government of the Rybinska. It is a busy place in the open season. Pop. 25,200, increased to 100,000 during the shipping months.

Rycaut (ri-kạt'), SIR PAUL, an English writer and diplomat, born about 1630; died in 1700. From 1661-69 he acted as secretary of legation at Constantinople, and subsequently for eleven years as consul at Smyrna. In these diplomatic offices he acquired considerable knowledge of the East, which he embodied in several historical works, as *The Present State of the Ottoman Empire, The Present State of the Greek and Armenian Churches,* etc.

Rydberg (rid'bār-y'), ABRAHAM VIKTOR, a Swedish poet, novelist and archæologist, born at Jonkoping, in 1828; died at Stockholm in 1895. His skill as a master of Swedish prose is well shown in his novels, and his poetry ranks high. Most of his works have been translated into English.

Ryde (rīd), a municipal borough and watering-place of England, on the northeast side of the Isle of Wight. It consists of several regular and well-built streets, and numerous detached villas surrounded by gardens, rising in terraces from the sea, and presenting a very pleasing appearance. A park on a rising ground to the east of the town, and the pier, form delightful promenades. Pop. (1911) 10,608.

Rye (rī; *Secāle cereāle,* nat. order Gramineæ), a species of grain of which there are several varieties. It is an esculent grain bearing naked seeds on a flat ear, furnished with awns like barley. It is a native of the Levant, but has been cultivated in Europe from time immemorial. It thrives in climates and in soils which forbid wheat; requires less manure, and ripens faster. It is extensively grown in Northern Europe, and rye bread forms the chief subsistence of the laboring classes of many parts of Russia, Sweden, Norway, Denmark, Holland and Prussia. Unmalted rye-meal mixed with barley malt and fermented forms the wash whence is distilled th

Rye (*Secāle cereāle*).

spirit known as Holland gin. Rye is grown in the United States and Canada, but is of minor importance, though the acreage devoted to this crop was considerably increased during the war of 1914-18. North Dakota had 2068 acres sown in the fall of 1918; Michigan had 910. Other important crops come from Wisconsin, Minnesota, South Dakota, Nebraska, Illinois, Indiana, Pennsylvania and Kansas. In Canada the principal rye crops are in Manitoba, Ontario, Saskatchewan, Alberta, and Quebec.

Rye, a village of Westchester Co., New York, 8 miles N. E. of New Rochelle. Rye beach is a popular summer resort. Prior to 1683, and from 1697 to 1700, Rye was included in Connecticut. Pop. 5308.

Ryerson (rī'er-son), ADOLPHUS EGERTON, a Canadian educator and Methodist clergyman (1803-82), born near Vittoria, Ontario. Ordained a minister of the Methodist Church at the age of twenty-one, he held several pastorates and was the most prominent Canadian Methodist of his time. It is, however, as the founder of the public school system of Ontario that he will be best remembered. Always deeply interested in Canada, he was appointed superintendent of schools in Upper Canada in 1844, and held that office with great distinction till 1876, when he resigned. He drafted a school bill, which became the model for many others in the Dominion. He was one of the founders of Victoria University (formerly Upper Canada Academy), and became its first president. His publications include *The Loyalists of America*, *Letters in Defense of Our School System*, and an autobiography.

Rye-grass, the common name of a number of grasses belonging to the genus *Lolium*, which presents the botanical anomaly of associating the most important herbage and forage grasses with the most pernicious weeds of agriculture. These grasses are readily known by the many-flowered sessile spikelets, arranged edgewise and alternately upon a zigzag rachis, and supported by a single herbaceous glume arising from the base, and pressing against the outer edge. The useful species are the *Lolium perenne* and the *L. multiflorum*, or Italian rye-grass. The latter is the most valuable.

Rye-house Plot, in English history, a conspiracy, planned in 1683, the immediate object of which was to assassinate Charles II and his brother, the Duke of York (afterwards James II), as they returned from the Newmarket races. This plan was to have been executed on the road to London, near a farm called Rye-house, belonging to one of the conspirators named Rumbold; but it was frustrated by the king and his brother happening to return from Newmarket earlier than was expected the detection of the plot led to the arrest on a charge of high treason of Lords William Russell, Essex and Algernon Sidney, who were in no way connected with it. Essex put an end to his own life in the Tower, while Russell and Sidney were beheaded, as also Lieutenant-colonel Walcot, one of the real contrivers of the plot.

Rymer (rī'mėr), THOMAS, a critic and antiquary, born in 1641; did in 1713. He studied at Cambridge and at Gray's Inn, and was called to the bar in 1673. Succeeding Shadwell, in 1692, as historiographer royal, he was entrusted by the government with the task of making a collection of public treaties from the year 1101, which he began to publish in 1704, under the title of *Fœdera*. This work is a valuable source of history for the period it covers.

Rymer, THOMAS THE. See *Rhymer*.

Ryotwar (rī-ot-war'), in India, and especially in the Madras Presidency, the system of land tenure by which the ryots or cultivators of the soil are directly under government, paying so much annually according to assessment.

Rysbrach (rīs'brak), JOHN MICHAEL, a sculptor, born at Antwerp in 1693 or 1694; died in 1770. He came to England early in life, and derived considerable reputation and profit from the exercise of his art, of which Westminster Abbey and other cathedral churches contain specimens.

Ryswick (rīs'wik; properly *Rijswijk* —rīs'wīk), a village and castle situated in South Holland, not far from The Hague, where the Peace of Ryswik, which terminated the war waged against Louis XIV by a league consisting of Holland, the German Empire, Britain, and Spain, was signed (September 20 and October 30, 1697).

Rzhev (rzhef), a town of Russia, in government of Tver, on the Volga. It has hemp-spinning industries and a large river trade. Pop. 22,000.

S

S, the nineteenth letter of the English alphabet, representing the hissing sound produced by emitting the breath between the roof of the mouth and the tip of the tongue placed just above the upper teeth. From this circumstance it has sometimes been reckoned among the linguals (as the tongue is essential in its pronunciation), sometimes among the dentals (as the teeth coöperate in producing the hissing sound). More descriptively it is classed as a *sibilant*. It has a twofold pronunciation—sharp or hard as in *sack, sin, this, thus;* and soft or sonant (when it is equivalent to *z*), as in *muse, wise.*

Saadi. See *Sadi.*

Saale (zä'lė), the name of several German rivers, the most important of which is that which rises on the north side of the Fichtelgebirge, in the northeast of Bavaria, and joins the Elbe after a course of above 200 miles. It passes the towns Hof, Jena, Naumburg, Merseburg, Halle, etc., and is of great commercial importance.

Saalfeld (zäl'felt), a town of Germany, duchy of Saxe-Meiningen, on the left bank of the Saale. It has several considerable industries. Pop. 14,400.

Saar (zär; French, *Sarre*), a river of Alsace-Lorraine and Rhine Province, about 150 miles long, from Vosges mountains to Moselle river near Treves. The coal fields in its basin were ceded to France by Germany in 1919.

Saarbrücken (zär'brük'ėn; French *Sarrebruck*), a town of the Rhine Province on the Saar, ceded with adjoining territory in the Saar Basin to France by Germany in 1919 as compensation for the destruction of the coal mines in the north of France during the European war (q. v.). It is the center of a rich coal-mining region. Across the river, connected with Saarbrücken by two bridges, is the old town of St. Johann. The first engagement in the Franco-Prussian war took place at Saarbrücken, August 2, 1870. Pop. 105,097.

Saardam. See *Zaandam.*

Saarlouis (*zär lö-i;* French, *Sarre-louis*), a town in the Saar basin, ceded to France in 1919. It was in French hands from 1697 to 1815, then ceded to Prussia. There are iron, lead and coal mines in the vicinity. Among the manufactures are trinkets and leather goods. Pop. 8313.

Saaz (zäts), or SAATZ, a town of Bohemia, on the right bank of the Eger, which is crossed here by a chain-bridge. It is in a fertile district and has an important trade in hops. It is an old town and has a church dating from 1206. Pop. 16,168.

Saba (sä'bä), a small West Indian island, belonging to Holland, and governed as a dependency of Curaçao. It consists of a single volcano cone, furrowed by deep, wooded and fertile valleys, producing sugar, cotton and indigo. Area, 5 sq. miles; pop. 2254.

Sabadell (sä-bä-del'), a manufacturing town in Spain, province of Barcelona. Wool and cotton spinning and weaving are chiefly carried on. Pop. 23,294.

Sabadilla (sa-ba-dil'a), CEBADILLA, or CEVADILLA, the name given in commerce to the pulverized seeds of two plants, the *Asagræa officinālis* of Lindley, and the *Veratrum Sabadilla*, both belonging to the nat. order Melanthaceæ. Mexico now supplies the bulk of the sabadilla seeds employed in pharmacy. The seeds of both plants are long, triangular, blackish-brown outside, white inside, of an acrid and burning taste, but without smell. Sabadilla powder is used as a vermifuge. The alkaloid extracted from the seeds, and known as *veratrine*, is applied externally in cases of neuralgia, rheumatism, gout, dropsy and also as an insecticide. Large doses of veratine act as a most irritant and energetic poison, while small doses prove a rapid cathartic and diuretic.

Sabæans (sa-bē'anz), the ancient name of the inhabitants of the modern Yemen, in Southwestern Arabia. Their capital was Saba.

Sabæans, SABAISM. See *Sabians.*

Sabal (sa'bal), the genus to which the palmetto belongs.

Sabanilla (sȧ-bȧ-nēl'yȧ), a seaport of Colombia, serving as the port of Barranquilla. See *Barranquilla.*

Sabbatarians (sab-a-tā'ri-anz), a name formerly applied to the sect of Baptists now called Seventh-day Baptists.

Sabbath (sab'ath; a Hebrew word signifying rest), the day appointed by the Mosaic law for a total cessation from labor, and for the service of God, in memory of the circumstance that God, having created the world in six days, rested on the seventh. Sabbath is not strictly synonymous with Sunday. Sunday is the mere name of the day; Sabbath is the name of the institution. Sunday is the Sabbath of Christians; Saturday is the Sabbath of the Jews and some minor Christian sects. The first notice in the Old Testament pointing to the Sabbath occurs in Gen. ii, 2, 3; but the first formal institution of the day as a holy day and a day of rest is recorded in Exod. xvi, 22–26, on the occasion of the children of Israel gathering manna in the wilderness. Soon after the observance of the day was re-enacted still more expressly and emphatically in the tables of the law. Prior to the captivity the Jews kept the Sabbath very indifferently, but after their return from Egypt Nehemiah exerted himself to secure the true observance. Gradually the original law became encumbered with a long list of petty pharisaical and rabbinical regulations. The Sabbath began at sunset on Friday and ended at sunset on Saturday. On the Sabbath the Jews were not allowed to go out of the city further than 2000 cubits, that is, about a mile, and this distance was called a *Sabbath-day's journey.* And as every seventh day was a day of rest to the people, so was every seventh year to the land. It was unlawful in this year to plow or sow, or prune vines; and if the earth brought forth anything of its own accord, these spontaneous fruits did not belong to the master of the ground, but were common to all. This year was called the *Sabbatical year,* and was also to be a year of release for Jewish debtors. In the Gospels the references to the Sabbath are numerous, and they show us that Christ always paid respect to the institution, although he did not regard the minute prohibitions that had been added to the original law. The desire of distinguishing the Christian from the Jewish observance early gave rise to the celebration of Sunday, the first day of the week, instead of the Sabbath. In 366 the Council of Laodicea removed all scruples as to the duty of Christians to keep the Jewish Sabbath. See *Sunday.*

Sabellians. See *Sabellius.*

Sabellius (sa-bel'i-us), a Christian teacher at Ptolemais in Upper Egypt, who lived about 250, and is known as the founder of a sect who considered the Son and Holy Ghost only as different manifestations of the Godhead, but not as separate persons. He taught that as man, though composed of body and soul, is but one person, so God, though he is Father, Son and Holy Ghost, is but one person. Dionysius of Alexandria wrote against Sabellius, and Pope Dionysius condemned him in a council held at Rome in 263. As a sect the Sabellians have been extinct since the beginning of the fifth century, but their views have always found adherents.

Sabians (sā'bi-anz), or SABÆANS, a name improperly given by writers of the middle ages to heathen star-worshipers. It is also given to a sect which arose about 830, and whose members are also called Pseudo-Sabians, or Syrian-Sabians, from the fact that the sect originated among the Syrians of Mesopotamia. Their religion is described as the heathenism of the ancient Syrians, modified by Hellenic influences. This sect flourished for about two centuries. See also *Christians of St. John.*

Sabicu (sa-bi-kū'), or SAVICU', a leguminous tree, *Lysiloma Sabicu,* native of Cuba. It furnishes an exceedingly heavy and hard wood, with a texture as smooth, close and firm as ivory almost, and of a rich, warm, red color. It is much employed for ship-building and cabinet-making.

Sabine (sa-bēn'), a river which rises in the northeastern part of Texas, and after a course of some 500 miles flows into the Gulf of Mexico through Sabine Bay. It is too shallow to be of much use for navigation.

Sabine (sab'in), SIR EDWARD, a British astronomer and physicist, born at Dublin in 1788; died at East Sheen (Surrey) in 1883. He was educated for the army at Woolwich, and obtained a lieutenant's commission in the Royal Artillery. Although he gained the rank of major-general in 1859, it is not to his military achievements that he owes celebrity, but to his earnest and long-continued researches in astronomy and physical geography. As astronomer he accompanied Sir J. Ross, and afterwards Sir E. Parry, in search of the Northwest Passage, made valuable observations, and

collected numerous data regarding the length of the pendulum and the variations of the magnetic needle. He made other voyages to tropical and Arctic regions to investigate these and allied subjects, and published his researches in the *Philosophical Transactions*, and the *Transactions* of the British Association and the Royal Society. From 1861–71 he presided over the Royal Society, and in 1869 he was created a K.C.B.

Sabines (sab′inz; *Sabini*), an ancient people widely spread in Middle Italy, allied to the Latins, and already an important nation prior to the foundation of Rome. Originally they were confined to the mountain districts to the N. E. of Rome, and their ancient capital was Amiternum, near the modern Aquila. As an independent nation they ceased to exist in 290 B.C., when they were incorporated with the Roman state. See *Rome* (*History*).

Sabines, RAPE OF THE. See *Romulus.*

Sable (sā′bl), a digitigrade carnivorous mammal, nearly allied to the common marten and pine marten, the *Mustēla zibellīna*, found chiefly in Siberia and Kamchatka, and hunted for its fur. Its length, exclusive of the tail, is about 18 inches. Its fur, which is extremely lustrous, and hence of the very highest value, is generally brown, grayish-yellow on the throat, and with small grayish-yellow spots scattered on the sides of the neck. It is densest during winter, and owing to the mode of attachment of the

Sable (*Mustēla zibellīna*).

hairs to the skin it may be pressed or smoothed in any direction. Two other species of sable are enumerated, the Japanese sable (*M. melanŏpus*) and a North American species (*M. leucŏpus*). The Tartar sable (*M. siberica*) is the name given to a species of the weasel genus found in Northern Russia and Siberia, and the pekan (*M. canadensis*) of North America is sometimes known as the Hudson Bay sable. The skins of all these varieties are frequently dyed and otherwise manipulated to imitate the true Russian sable. Sable hair is also used in the manufacture of artists' pencils. Sable fur has been of great value from very early times.

Sable, in heraldry, black, one of the tinctures used in blazonry. In engraving it is expressed by perpendicular crossed by horizontal lines. See *Heraldry.*

Sable Island, a low treeless sandy island in the North Atlantic, off the east coast of Nova Scotia, 25 miles long and 1 to 5 broad.

Sables (sä-bl), or SABLES D'OLONNE, a seaport in France, department of Vendée, on the Atlantic. It is built partly on an eminence in the form of an amphitheater, and partly on a flat, and has a good harbor, valuable fisheries of oysters and sardines, and a considerable trade. It is much resorted to for sea-bathing. Pop. 12,244.

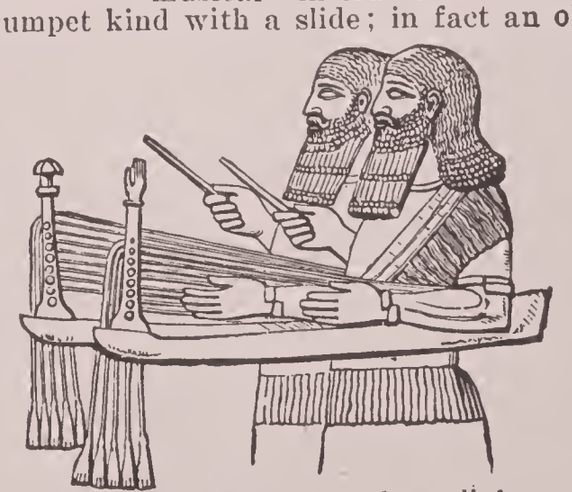
Sabotage (sȧ-bō-tȧj), the wilful injury or destruction of machinery or materials by workmen through apparently accidental means. The word *sabotage* is of French origin, and tradition has it that a workman in a rage one day threw his wooden shoe (sabot) into some machinery. Others, seeing the result, adopted similar means.

Sabots (sȧ-bō), wooden shoes made each of one piece hollowed out by boring-tools and scrapers. They are largely worn by the peasantry of several European countries. In France their manufacture forms an important industry.

Saber (sā′bėr), a broad and heavy sword, thick at the back and somewhat curved at the point. It is the chief weapon of cavalry regiments.

Saber-tache (-tash), a leathern case or pocket worn by cavalry officers at the left side, suspended from their sword-belt.

Sacbut (sak′but), or SACKBUT, a musical instrument of the trumpet kind with a slide; in fact an old



Assyrian Sacbut, from bas-relief.

variety of trombone (which see). The instrument called *sabbeka* in the Hebrew Scriptures has been erroneously rendered as sacbut by the translators. The exact form of the sabbeka has been much disputed, but that it was a stringed instrument is certain, for the name passed over into Greek and Latin in the forms *sambukē, sambuca,* a harp-like instrument of four or more strings. The instrument shown in the accompanying illustration is believed to represent a form of the sacbut of Scripture.

Saccatoo. See *Sokoto.*

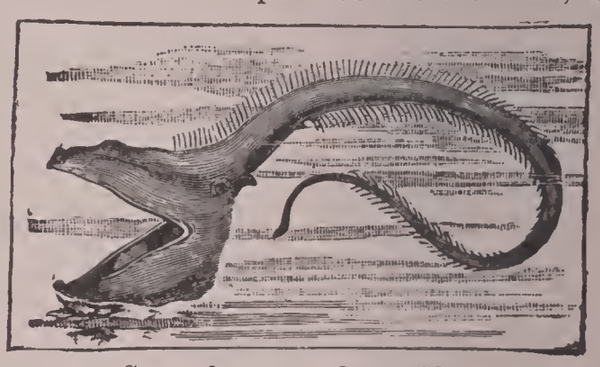
Saccharides (sak'ar-īdz), a name sometimes applied to a group of carbon compounds formed from sugars by the action of various organic acids.

Saccharin (sak'ar-in), an artificial sugar prepared from coal-tar, first introduced to commerce in 1887 by its discoverer, Dr. Constantin Fahlberg, of Salbke (Germany). Its sweetening properties are enormous; one grain of saccharin is said to sweeten distinctly 70,000 grains of distilled water. It is not a fermentable sugar, and is already in common use in the treatment of disease, as diabetes, for instance; and in many cases in which the palate craves for sweets, but in which ordinary sugar is apt to cause trouble. The French Conseil d'Hygiène et de Salubrité appointed a commission to inquire into the properties of saccharin, and their report, issued in 1888, states that its use in food would seriously affect the digestive functions and recommends the government to prohibit its employment in alimentary substances. The discoverer and many eminent chemists, Continental and British, deny that saccharin is injurious to the human system, and it is also asserted that the hostility to the new sweetening substance emanates from those interested in the French sugar industry. It is largely in use in Germany in the manufacture of confectionery, brewing, etc., and is used by many for sweetening beverages, as tea and coffee. It has recently been strongly condemned in the United States as a dangerous substance, though the indication is that it is not very actively injurious.

Saccharometer (sak-a-rom'e-tėr), or SACCHARIMETER, an instrument for determining the quantity of saccharine matter in any solution. One form is simply a hydrometer for taking the specific gravity of the solution; another is a kind of polariscope, so arranged that the solution may be interposed between the polarizer and analyzer, and by observing the angle through which the plane of polarization is turned in passing through the solution the datum is given for the calculation of the strength. (See *Polarization.*) Several saccharometers acting on this principle, but varying somewhat in construction, are now in use.

Saccharum (sak'a-rum), a genus of grasses. See *Sugar-cane.*

Saccopharynx (sak'o-far-inks), or EURYPHARYNX, a genus of eels, family Murænidæ. The best-known species (*S. pelecanoides* or *Eurypharynx pelecanoides*) was discovered in the latter part of the last century. It inhabits the depths of the Atlantic, is



Saccopharynx pelecanoides.

of a perfectly black color, is sometimes 9 feet in length, and but seldom met with. It owes its name to its pouch-like pharynx, which enables it to swallow other fish of large dimensions. It is also known as pelican fish. The muscular system is but little developed, and the bones are thin and soft.

Sacheverell (sa-shev'ėr-el), HENRY, an English divine, born in 1674; died in 1724. While preacher at St. Saviour's, Southwark, he in 1709 delivered two bitter sermons against dissent, and accused the existing Whig ministry of jeopardizing the safety of the church. He was impeached in the House of Commons, tried in the spring of 1710, and suspended for three years. This persecution secured him at once the character of a martyr, and helped to stimulate the already fierce passions which then divided the Whig and Tory parties. Sacheverell became the popular hero of the hour; while the Godolphin (Whig) ministry was overthrown. Parliament thanked him for his defense of the church, and as soon as his suspension expired Queen Anne presented him with the rich living of St. Andrew's, Holborn. Sacheverell, having no merit to keep him permanently before the public, now fell back into obscurity.

Sachs (zåks), HANS, the most distinguished meistersinger of Ger-

many in the sixteenth century, born at Nuremberg in 1494; died in the same city in 1576. He learned the trade of a shoemaker, and after the usual *wanderjahre*, or period of traveling from place to place, commenced business in his native city, married (1519), and prospered. An enthusiastic admirer of the Minnesingers, he took lessons under one of the chief meistersingers of Nuremberg, and to while away the tedium of the cobbler's art made verses himself. In this he soon surpassed all his contemporaries. Thousands of verses flowed from his fertile brain, crude, but full of imagery and humor. As a staunch follower of Luther, and an ardent advocate of his teachings, Sachs succeeded in imparting to his hymns a fervor which considerably aided the spread of the Reformation. A bronze statue to his memory was erected in 1874 at Nuremberg, where his house may still be seen.

Sachsen (zäk'sen), the German form of Saxony (which see).

Sachsen-Altenburg, Sachsen-Coburg-Gotha, etc. See *Saxe-Altenburg*, etc.

Sack (Spanish, *secco;* French, *sec*, 'dry'), formerly a general name for the different sorts of dry wine, more especially the Spanish, which were first extensively used in England in the sixteenth century.

Sackatoo. See *Sokoto.*

Sackbut. See *Sacbut.*

Sackville (sak'vil), THOMAS, Lord Buckhurst and Earl of Dorset, an English statesman and poet, son of Sir Richard Sackville of Buckhurst, born in 1536; died in 1608. At Oxford and Cambridge he distinguished himself by his Latin and English poetry, and as a student of the Inner Temple he wrote, in conjunction with Thomas Norton, the tragedy of *Gorboduc*, or *Ferrex and Porrex* (published in 1561), remarkable as the first example in English of regular tragedy in blank verse. The *Mirror of Magistrates*, and the *Complaint of Henry, Duke of Buckingham*, the introduction to an intended series of poems on the tragic lives of famous men, make one regret that he was induced to abandon literature for politics. He took a prominent and creditable part in some of the chief events of Elizabeth's reign. He was a member of the court which tried Mary Queen of Scots; he succeeded Lord Burleigh as lord-high-treasurer; and presided at the trial of the Earl of Essex. From 1587–88 he suffered imprisonment at the instigation of the queen's favorite, Leicester. In 1566 he had succeeded to his father's ample estate; was raised to the peerage as Baron Buckhurst shortly afterwards; and James I created him Earl of Dorset in 1604. He was buried at Westminster Abbey.

Saco (sa̧'kō), a river rising in the White Mountains in New Hampshire and running southeast into the Atlantic below Saco, Maine. It is 160 miles long, and has falls of 72 feet at Hiram, of 42 feet at Saco, and numerous minor ones.

Saco, a city of York county, Maine, 14 miles S. W. of Portland, and on the river of the same name, which supplies water-power to large cotton factories, cotton machinery works, and other manufactures. It is connected by bridge with Biddeford, on the opposite side of the river. Pop. (1920) 6817.

Sacrament (sak'ra-ment; Latin, *sacramentum*), a pledge, an oath, in particular the military oath of allegiance. This word received a religious sense, in the Christian Church, from its having been used in the Vulgate to translate the Greek *mystērion*, a mystery. Among the early Latin ecclesiastical writers *sacramentum*, therefore, signifies a mystery, a symbolical religious ceremony, and was most frequently applied by them to the rite of baptism. In modern Christian theology sacrament is defined as an outward and visible sign of an inward and spiritual grace, a solemn religious ceremony enjoined by Christ to be observed by his followers, and by which their special relation to him is created, or their obligations to him renewed and ratified. In early times the church had also sacramentals, as many as thirty being enumerated in the first half of the twelfth century. The Roman Catholic and Greek churches recognize seven sacraments: Baptism, Confirmation, the Eucharist, Penance, Extreme Unction, Orders and Marriage. Protestants in general hold Baptism and the Eucharist to be the only sacraments. The Socinians regard the sacraments merely as solemn rites, having no divine efficacy, and not necessarily binding on Christians. The Quakers consider them as acts of the mind only, and have no outward ceremonies connected with them.

Sacramento (sak-ra-men'tō), the largest river of California. It rises in Lassen Co., flows west, then south and drains the central valley of California from the north. Its course is about 500 miles, 320 of which are navigable for small vessels. It discharges its waters into Suisun Bay, on the line between Contra Costa and Solano-

cos. The only large town on it is Sacramento. It is navigable to this town, and for small vessels to Red Bluff, about 300 miles.

Sacramento, the capital of California, county seat of Sacramento Co., on the Sacramento River, 90 miles N. E. of San Francisco. The principal buildings include the Capitol, a $4,700,000 structure located in Capitol Park of 34 acres; the county court house, city hall, city library, etc. It is the trade center of the fertile Sacramento valley, with a grain, fruit and vegetable production worth $115,000,000 annually. The main shops of the Southern Pacific and Western Pacific railroads (5000 employees) are here. The fruit and vegetable canneries of the county do an annual business of $16,000,000. It has manufactures of tractors, trucks, iron and steel castings, pipe, clay products, etc. Sutter's Fort, the foundation of Sacramento, is among the objects of historic interest. Incorporated as a town in 1849, it became the State capital in 1854; chartered as a city in 1863. Pop. (1910) 44,696; (1920) 65,857.

Sacred Fires, THE, of India have been in continuous existence for more than twelve centuries. They were consecrated by the Parsees on their emigration from Persia. The flame is fed five times each two hours with sandal-wood and other fragrant combustibles. The priests in attendance are descendants of the Zoroasters of ancient Babylon. See *Zoroasters.*

Sacrifice (sak'ra-fīs), a gift offered with some symbolic intent to the Deity, generally an immolated victim or an offering of any other kind laid on an altar or otherwise presented in the way of religious thanksgiving, atonement, or conciliation. The origin of sacrifice is a point much disputed; the two opposed views being that of a primeval appointment by the Deity, and that of a spontaneous origination in the instinctive desire of man to draw near to God. The symbolic character of sacrifice may be represented under three heads: (1) Propitiatory, or designed to conciliate generally the favor of the Deity; (2) Eucharistic, or symbolical of gratitude for favors received; (3) Expiatory, or offered in atonement for particular offenses. To a different class may be assigned deprecatory sacrifices designed to avert the wrath or appease the wicked disposition of deities. The customs of the Jews regarding sacrifice are noteworthy on account of their very express and explicit claims to a divine origin, and because of their connection with the Christian religion. Details are amply given in the Book of Leviticus. Few religions, whether ancient or modern, have omitted sacrifices from among their rites. The ancestors of all the existing races in Europe practiced human sacrifices, and similar usages widely prevailed throughout the world. Among Christians the Roman Catholic and Greek churches regard the mass as a mysterious sacrifice; but with Protestants it is not generally so regarded.

Sacrilege (sak'ri-lej), in a general sense, the violation or profaning of sacred things; more strictly the alienating to laymen, or common purposes, what was given to religious persons and pious uses. Church robbery, or the taking things out of a holy place, is sacrilege, and by the common law was formerly punished with more severity than other thefts, but it is now put by statute on the same footing with burglary or house-breaking.

Sacristan (sak'ris-tan), the same as *sexton,* which is corrupted from it, an officer in a church whose duty it is to take care of the church, the sacred vestments, utensils, etc.

Sacristy (sak'ris-ti), the apartment in or connected with a church intended for the keeping of the sacred vestments and utensils while not in use, and in which also the clergy and others who take part in religious ceremonies array themselves for so doing.

Sacrobosco (sa-krō-bos'kō), or JOHN HOLYWOOD, a mathematician and astronomer of the thirteenth or fourteenth century. He was a native of Britain, but lived chiefly in France, and died at Paris as professor of mathematics at the university.

Sacrum (sā'krum), in anatomy, the bony structure which forms the basis or inferior extremity of the vertebral column. The human sacrum forms the back part of the pelvis, is roughly triangular in shape, consists of five united vertebræ, and from its solidity it is well adapted to serve as the keystone of the pelvic arch, being wedged in between and articulating with the haunch-bones. In most mammals the number of vertebræ forming the sacrum is smaller than in man. In birds the lowest number is about ten. Fishes possess no sacrum at all.

Pelvic Bones. *s,* Sacrum

The sacrum in man is fully ossified and completed in development from the twenty-fifth to the thirtieth year of life, but the component parts can generally be perceived even in the most aged individuals.

Sacy (sȧ-sē), Antoine Isaac, Baron Silvestre de, a French philologist, born in Paris in 1758; died in 1838. After acquiring a thorough knowledge of the Greek and Latin classics, he studied Hebrew, Syriac, Chaldee, Samaritan, Arabic and Ethiopic; mastered the principal European languages, including Turkish, and later on also Persian; was appointed professor of Arabic in the School of Oriental Languages in 1795, and in 1806 professor of Persian at the College of France. In 1808 he was elected to the Corps Législatif. He was one of the most active members of the Asiatic Society and of the Academy of Inscriptions, and a prolific contributor to the learned *Transactions* of the period. Napoleon created him a baron in 1813, and under Louis Philippe he became a member of the chamber of peers in 1832. His teaching gave a powerful impetus to the study of Oriental languages in Europe.

Saddle (sad'l), a kind of seat for a horse's back, contrived for the safety and comfort of the rider. In early ages the rider sat on the bare back of his horse, but in course of time some kind of covering was placed over the back of the animal. Such coverings became afterwards more costly, and were sometimes richly decorated. The modern riding saddle consists of the tree, generally of beech, the seat, the skirts and the flaps, of tanned pigskin, and the construction and weight vary according to the purposes for which it is to be used. Among the varieties are racing saddles, military saddles, hunting saddles and side-saddles for ladies. The name saddle is also given to a part of the harness of an animal yoked to a vehicle, being generally a padded structure by means of which the shafts are directly or indirectly supported.

Saddleworth (sad'l'wurth), a town of Yorkshire, England, in the valley of the Tame, 11 miles S. W. of Huddersfield. Has cotton and woolen manufactures. Pop. (1911) 12,605.

Sadducees (sad'ū-sēz), one of the two chief sects or parties existing among the Jews in the time of Christ. Various accounts are given of their origin. Some critics recognize in the Sadducees the descendants and adherents of the Zadok mentioned in 1 Kings i. 39. For the knowledge we possess about them we are indebted to the New Testament and to Josephus, a Pharisee, but comparatively little of their actual position is certainly known. They were a less numerous, but more aristocratic party than the Pharisees; they possessed the largest share of wealth, and, in consequence, generally held the highest dignities. A constant feud existed between the two sects. The Sadducees were distinguished for three special beliefs or doctrines: they repudiated the oral law, they denied the resurrection of the dead, and disbelieved in the existence of angels and spirits (or at least did not hold the current views regarding these). The Sadducees rapidly disappeared after the first century of the Christian era.

Sadi (sȧ'dē), or Saadi, the most celebrated didactic poet of Persia, born at Shiraz about the end of the twelfth; died about the end of the thirteenth century. In his youth he visited Hindustan, Syria, Palestine and Abyssinia, and made several pilgrimages to Mecca and Medina. While in Syria he was taken by the Crusaders, and actually compelled to labor as a slave at the fortifications of Tripoli. After about fifty years of wandering he returned to his native city, delighting everybody with his poems and sage precepts. The best of his works are: *Gulistan* ('Garden of Roses'), a moral work, comprising stories, anecdotes, and observations and reflections, in prose and verse; and *Bostān* ('the Orchard'), a collection of histories, fables and moral instructions in verse.

Sadler (sad'ler), or Sadleir, Sir Ralph, an English statesman, born in 1507; died in 1587. Thomas Cromwell, earl of Essex, in whose family he had been employed for some time, brought him under the notice of Henry VIII, and the king charged him with several important missions to Scotland, and created him a knight in 1543. As a staunch Protestant he relinquished public life during the reign of Mary, but on the accession of Elizabeth in 1558 he entered Parliament, became a privy-councilor, and the queen employed him again in Scotland. During Queen Mary's imprisonment at Tutbury, Sadler was for a time her keeper, and after her execution in 1587, and just about a month before his own death, he had to perform the duty of carrying Elizabeth's letter of condolence and apology to James VI of Scotland.

Sadowa (sä'dō-vä), a village on the Bistritz, in Bohemia, not far from Königgrätz. It is celebrated as the scene of the preliminary engagement, on July 3d, 1866, between the Austrians under Benedek and the Prussians under Prince Frederick Charles, which culmi-

nated in the decisive battle of Königgrätz. The whole conflict is also known as the battle of Sadowa.

Safe (sāf), a receptacle for valuables, of iron or steel, or both combined. A safe to answer all requirements should be fire, explosive, acid, drill and wedge-proof. A fire-proof safe need only be so constructed that, although exposed to the intense heat of a conflagration, its inner recesses remain at a sufficiently low temperature to prevent combustion of the contents. A burglar-proof safe needs many other safeguards, and the history of safe-making is mainly a record of struggles between the safe manufacturer and the burglar; the result is that safes can now be obtained which are all but impregnable. The safe consists of an outer and an inner wall, the space between being filled with some fireproof material such as asbestos, silicate cotton, gypsum, etc. The outside casing, which may be single or compound, naturally receives the greatest attention, and various are the devices of manufacturers to render it sufficiently hard and solid to resist the finely-tempered drills of the burglar. To prevent wrenching, the door is secured by bolts moving straight or diagonally into slots on one or on all sides. These bolts are moved by the door handle, and the lock-key fixes them in their positions. With the modern safe of the best kind, the lock may be said to be the only vulnerable point, hence much care and ingenuity have been expended on its mechanism. The first great improvements in locks, as applied to safes, are due to Chubb of London, a name which still stands in the front ranks of safe-lock makers; but numerous patents, mostly of American origin, have in recent years been introduced. Of these the keyless permutation locks deserve particular mention, as they obviate the danger which arises from lost or false keys. Such locks allow of opening only after an indicator has been moved in accordance with a certain combination of numbers arranged before closing the safe. Some safe-locks are so constructed that to be freed they require different keys on different days, some can only be opened at a certain hour, this being fixed on before the door is closed; while others again require two or more keys in charge of different persons; in fact, the arrangements contrived to render the plundering of safes next to impossible are too numerous even to mention. The connection of safes with electric alarms in a variety of ways forms another safeguard.

Safe-conduct, a protection granted by authority to persons traveling in an enemy's or in a foreign country to secure them against molestation. These special safe-conducts have in modern times been mostly superseded by the passport system.

Safed (saf'ed), a town of Palestine, the most elevated place in Galilee, lying 2700 feet above the sea. Here are the ruins of a castle built by the Crusaders. It lies 6 miles N. W. of the Sea of Galilee, and is one of the four holy cities of the Jews in Palestine; a Jewish colony has been settled here since the sixteenth century, and of its 25,000 inhabitants about half are Jews.

Safed Koh (sâ-fed' kō) ('White Mountains'), a mountain range in Afghanistan. The westerly portion of the chain separates the Herat river valley from the Murghab, while the easterly Safed Koh forms the southern boundary of the Cabul basin. These mountains are quite alpine in their character, and some of the peaks exceed 15,000 feet in height. Among the spurs of the eastern section are the passes leading from Cabul to Jalalabad, and from Jalalabad to Peshawur, famous in the annals of British military expeditions into Afghanistan.

Safety-ink, an ink for use on checks or other important papers, which if tampered with will disclose the fact in some way, as by change of color.

Safety-lamp, a lamp for lighting coal-mines without exposing the miners to explosions of fire-damp. The first safety-lamp was invented by Sir Humphry Davy in 1816, and until a quite recent period his system, with some slight modifications, was in general use. It consists principally of a cistern to hold the oil, in the top of which the wick is placed. Over the cistern a cylinder of wire-gauze is fixed so as to envelop the flame. The lamp is closed by a bolt passing through both parts, and to prevent the miner from exposing the flame a locking arrangement exists. The diameter of the gauze wire is from $\frac{1}{40}$ to $\frac{1}{60}$ of an inch, and the apertures do not exceed the $\frac{1}{22}$ of an inch square. The Stephenson lamp, better known among miners as the 'Geordie,' has a glass chimney as well as the wire-gauze, and the air to feed the flame enters through a perforated ring just below the wick. This lamp, though safer than the Davy, if used with care, becomes a source of danger if the perforated ring is allowed to get clogged and the glass chimney overheated. A series of trials with safety-lamps, made in Britain by a committee of the Midland Institute, led to the condemnation of the

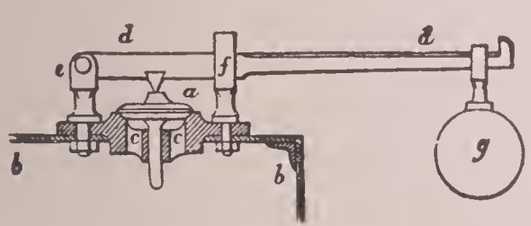
ordinary Davy and Stephenson lamps, and to the introduction of the Mueseler, Marsant, and several other lamps, which had been used with satisfaction in Belgian and French mines. They are, however, all modifications of the principle which underlies the original invention of Sir Humphry Davy. A safety-lamp recently brought before the public is the Thornebury, which is said to be self-extinguishing in an explosive mixture of fire-damp and air, to give a strong light, to be simple in construction, and absolutely safe. There are also several electric miner's lamps in the market. In addition to safety-lamps many other safety appliances are in use in mines and American inventors have produced various useful devices.

Safety-match, a match tipped with a substance that will ignite only by friction with a specially prepared surface. Matches of this kind are now largely in use, as being free from the dangers of the older style of friction matches.

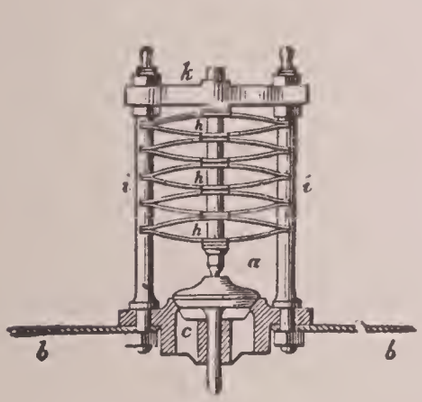
Safety-pin, a pin for fastening clothing, the point of which is covered with a sort of sheath to prevent its pricking or scratching, and is held in place by a spring.

Safety-razor, a shaving implement in which the blade rests in a frame so formed as to prevent the cutting edge from abrading or cutting the skin. It is of common use for home shaving.

Safety-valve, a contrivance for relieving the pressure of steam before it becomes too great for the calculated strength of the containing vessel. The commonest form of safety-valve on steam-boilers is a lid (*valve*), pressed against a hole (*seat*) by either a spring or a weight; the spring or weight not exerting a greater force than can be overcome by the pressure of the steam inside, part of which then escapes and obviates any danger. The valve is round, is beveled round the edge, and is furnished with a spindle which moves loosely in a guide attached to the seat; the seat is beveled to fit the edge of the valve. On locomotive and on ships' boilers the valve is pressed against the seat by a spring arrangement; but on stationary boilers a weight should always be employed. Fig. 1 shows a safety-valve, in which a weight is employed. Here *a* is the valve, *b b* the boiler, *c c* the valve-seat, usually, like the valve itself, made of gun-metal, *d* the lever turning upon a fixed center at *e*, and pressing upon the valve by a steel point, *f* a guide for the lever, *g* a weight which may be shifted backwards and forwards according to the pressure desired. Fig. 2 shows a form of spring safety-valve, in which a series of bent springs *h h h* are placed alternately in opposite directions, their extremities sliding upon the rods *i i*, and the springs being kept down by the cross-bar *k*; *a* being the valve, *c* the valve-seat, and *b b* part of the boiler.



Lever Safety-valve.



Spring Safety-valve.

Safi (sä'fē), SAFIE, or AZFI, an ancient seaport in Morocco, on the west coast, at one time an emporium of the European trade with Morocco. The Portuguese held it from 1508–1641. Pop. about 10,000.

Safflower (saf'lou-ėr), or BASTARD SAFFRON (*Carthămus tinctorius*), a large thistle-like plant with orange-colored flowers, nat. order Compositæ. It is cultivated in China, India, Egypt and in the south of Europe. An oil is expressed from the seeds, which is used as a lamp-oil. The dried flowers afford two coloring matters (also called safflower), a yellow and a red, the latter (carthamine) being that for which they are most valued. They are chiefly used for dyeing silk, affording various shades of pink, rose, crimson and scarlet. Mixed with finely-powdered talc, safflower forms a common variety of rouge. In some places it is used in lieu of the more expensive saffron, and for adulterating the latter. The oil, in large doses, acts as a purgative.

Saffron (saf'run; *Crocus satīvus*, nat. order Iridaceæ), a low ornamental plant with grass-like leaves and large crocus-like purple flowers, cultivated in the East and in Southern Europe for

the sake of its stigmas. These when dried form the saffron of the shops, which has a deep-orange color, a warm bitterish taste, and a sweetish penetrating odor. Its orange-red extract is used by painters and dyers, and the saffron itself also in cookery and confectionery as a coloring and flavoring substance. Bastard saffron is safflower; meadow saffron *Colchicum autumnāle*.

Saffron-Walden (wąl'den), a municipal borough of England, county of Essex, 38 miles N. N. E. of London. It is a place of great antiquity, and carries on a considerable trade in malt, grain, cattle, etc. Pop. 6311.

Sagan (zä'gȧn), a town of Prussia, province of Silesia, government Liegnitz, on the Bober. It was formerly the capital of the principality of Sagan, and has still a ducal castle with fine garden and park. Various manufactures are carried on, especially that of linen. Pop. (1905) 14,208.

Sagapenum (sag-a-pē'num), a fetid gum-resin brought from Persia and Alexandria, generally believed to be furnished by some species of the genus *Ferŭla*. It occurs either in tears or irregular masses of a dirty brownish color, containing in the interior white or yellowish grains. It has an odor of garlic, and a hot, acrid, bitterish taste. It is occasionally used in medicine as a nervine and stimulating expectorant.

Sagas (sa'gaz, sā'gaz; 'tales'), the name given to a class of prose epics among the Icelanders, of a mixed character, blending fiction with authentic narrative. Some detail particular events relating to politics or religion, some the history of a particular family, and others the lives of kings and other eminent individuals. The sagas have been much studied by modern writers and critics, and they have elucidated the mythology, history, and antiquities of the North to an eminent degree. Originally they were composed for oral recitation, and prior to the twelfth century they lived only in the memories of the people, hence the varying versions of the same events. Between the twelfth and fifteenth centuries numbers of these detached tales were collected, written down, amplified or curtailed, and worked into a series of consecutive narratives. The sagas of the west of the island are most elegant in style, and this circumstance is attributed to Celtic influence. Among the more important sagas are: the Saga of Gisli, the outlaw; that of the hero and poet Egill; the Eyrbyggia Saga, a saga of very mixed contents; the Laxdœla Saga, the story of the Icelandic heroine Gudrun; the Saga of Grettir the Strong; the Saga of Nial, of great legal and historical value.

Sagasta (sag-as'ta), PRAXEDES MATEO, a Spanish statesman, born at Torrecilla, in 1827. He became an insurrectionist and twice had to flee to France. In 1868 he became a member of Prim's cabinet, supported Amadeus during his brief reign, held office under Serrano, and became leader of the Liberals under the new monarchy. He was premier, 1897-99, during the Spanish-American troubles. He died January 15, 1903.

Sage (sāj), the common name of plants of the genus *Salvia*, a very large genus of monopetalous exogenous plants, nat. order *Labiatæ*, containing about 450 species, widely dispersed through the temperate and warmer regions of the globe. They are herbs or shrubs of widely varying habit, usually with entire or cut leaves and various colored (rarely yellow) flowers. The best known is the *S. officinālis*, or garden sage. This plant is much used in cookery, and is supposed to assist the stomach in digesting fat and luscious foods. Sage-tea is commended as a stomachic and slight stimulant.

Sage-brush (*Artemisia Ludoviciana*), a low irregular shrub of the order Compositæ, growing in dry alkaline soils of the N. American plains. It is widespread over the arid regions of the West. The name is also given to other American species of *Artemisia*.

Sage Foundation, an institution established in 1907 by Mrs. Russell Sage, with an endowment of $10,000,000, its object being 'the improvement of social and living conditions in the United States.' Important researches have been made in the charity organization, child-helping, and child-hygiene departments. The Sage Foundation Home Company is erecting at Forest Hills, Long Island, a model garden city for people of moderate means.

Saghalien, SAGHALIN (sah'a-lēn), a long island in the North Pacific, separated from Manchuria by the Gulf of Tartary, opposite the mouth of the Amoor; area, 24,560 square miles. The center is mountainous. Climate, flora and fauna are almost Siberian. The inhabitants consist of Ainos and other aborigines, Russians, Japanese, etc., altogether some 12,000. The island formerly belonged to the Chinese Empire; later to Japan. In 1875 the Russians obtained it, but after the Russo-Japanese war it was divided between Russia and Japan.

Saginaw (sag-i-nạ), a city of Michigan, county seat of Saginaw County, and an important railway center, 96 miles N. W. of Detroit, on the Saginaw River, which is here navigable for the largest lake craft. It is the center of a productive beet-sugar district; also a bituminous coal district. There is here the largest bean elevator in the world. There are immense glass works, railroad and machine shops, shipbuilding yards, lumber and salt works, and many other industries. Pop. (1910) 50,510; (1920) 61,903; with new territory, 66,000.

Sagitta (sa-jit'a), a genus of annelids, forming the order Chætognatha. This animal is a transparent marine form, straight and slender, attaining the length of about an inch. The head carries a series of setæ or bristles surrounding the mouth, and the hinder margin of the body is fringed with a sort of fin. The species are found living in the open sea all over the world.

Sagitta'ria. See *Arrow-head.*

Sagittarius (saj-i-tar'i-us; the Archer), in astronomy, the ninth sign of the zodiac, into which the sun enters November 22. The constellation consists of eight visible stars. It is represented on celestial globes and charts by the figure of a centaur in the act of shooting an arrow from his bow.

Sagittate (saj'i-tāt), in botany, a term applied to the form of leaf shaped like the head of an arrow; triangular, hollowed at the base, with angles at the hinder part.

Sago (sā'gō), a starchy product obtained from the trunk of several species of a genus of palms named *Sagus*, and chiefly by *S. Rumphii* and *S. lævis.* The latter, from which the finest sago is prepared, forms immense forests on nearly all the Moluccas, each stem yielding from 100 to 800 lbs. of sago. The tree is about 30 feet high, and from 18 to 22 inches in diameter. It is cut down at maturity, the medullary part extracted and reduced to powder like sawdust. The filaments are next separated by washing, and the meal laid to dry. For exportation the finest sago meal is mixed with water, and then rubbed into small grains of the size and form of coriander seeds. The Malays have a process for refining sago, and giving it a fine pearly luster, the method of which is not known to Europeans; but there are strong reasons to believe that heat is employed, because the starch is partially transformed into gum. The sago so cured is in the highest estimation in all the European markets. Sago forms a light, wholesome, nutritious food, and may be used to advantage in all cases where a farinaceous diet is required. It is also largely used in the manufacture

Sago Palm (*Sagus lævis*).

of soluble cocoas, and for adulterating the common sorts of arrowroot. For Portland-sago see *Arum.*

Sagoïn (sā'gō-in), or SAGOUIN, the native South American name of a genus (*Callithrix*) of Brazilian monkeys of small size, and remarkably light, active and graceful in their movements.

Sagor. See *Saugor.*

Saguenay (sag'e-nā), a river of Canada, province of Quebec, formed by two outlets of Lake St. John, which unite about 9 miles below the lake, from which point the river flows S. E., and falls into the St. Lawrence at Tadousac Harbor; length about 100 miles. For many miles of the latter part of its course the banks are very lofty, and in some parts there are precipices more than 1000 feet high. Ships moor at rings fixed into some of the precipitous walls of rock, the water being so deep as to be unsuitable for anchorage. The Saguenay is navigable for vessels of any size to Ha Ha Bay, a distance of about 50 miles to 60 miles from the St. Lawrence, and at high-water for vessels of large dimensions from 15 miles to 18 miles farther. It is visited by many tourists on account of its remarkable scenery.

Saguntum (sa-gön'tum), formerly a town in Spain south of the Ebro, about 3 miles from the coast. It is famous in Roman history; its siege by Hannibal in 219–218 B.C. having given

rise to the second Punic war. The site is occupied by the modern town of Murviedro.

Sahara (sa-hā'ra; properly sä'ha-rä), THE, that vast and mainly desert tract of Northern Africa lying north and south of the Tropic of Cancer, between the Atlantic and the Nile. In the north it extends to and forms part of Morocco, Algeria, Tunis, Tripoli and Egypt; in the south it is chiefly bounded by the Soudan. This immense area, the greatest length of which is over 3000 miles and its area probably not less than 2,000,000 square miles, is not, as popularly supposed, a great level desert; on the contrary, it offers considerable variety of configuration and vegetation. The surface ranges from below sea-level to 8000 feet above it. There are the extensive and elevated plateaus of Tasili, Tibesti, etc., about the center of the Sahara, running from the north in a southeasterly direction, and presenting some high mountain masses. Between Tibesti and the Niger we have the elevated region of Air, and towards the Atlantic Adrar. These plateaus are intersected by many fertile valleys fit for agriculture and pasture. Other parts of the desert are broken by large oases with a most luxuriant vegetation, such as Twat, Wargla and Fezzan. On the borders of Algeria oases have been created artificially by means of artesian wells. A vast tract of true desert, El Djuf, lies in the west-central region, and unites all the worst characters of the desert — want of water, intense heat and moving sands. In the desert proper there is little of animal or of vegetable life. A few species of antelopes, the wild ass, the mountain sheep, the hyena, the baboon, the tortoise and the ostrich, are met with in favored spots. Lizards, jerboas and serpents of many kinds retain undisturbed possession of the burning sands. Where herbage exists it is mainly composed of such plants as require but little moisture. The vegetable wealth of the desert-dweller lies in the date-palm. The population, estimated at about 2½ millions, consists of various tribes of Arabs, Berbers and negroes. The Berbers are almost confined to the west-central, and the negroes to the east-central parts, while the Arabs predominate in the other regions. Camel breeding, slave and salt dealing, caravan conducting and brigandage form the chief occupations of a large section. A number of caravan routes through the Sahara connect Timbuctoo and the Soudan with the maritime countries in the north. Recent explorations have finally disposed of the idea that the Sahara is the dried-up bed of a former inland sea, and that it could be restored to its former condition by admitting the waters of the ocean. The diluvial sea theory is now limited to the low-lying districts, El Djuf and Kufra, which abound in rock-salt deposits. Spain annexed in 1887 the coast between Morocco and Senegal, and by treaty secured considerable territory inland. France controls a large section of it.

Sahárunpur (sa-hä-ran-pur'), a town in Hindustan, capital of the district of the same name, in the Northwest Provinces. It has many handsome residences in the European style, a government stud, a botanic garden, and a large sugar and grain trade. Pop. 66,254.

Sahib (sä'ib), the usual term of address by natives of India towards a European gentleman.

Sai (sä'i), the name applied to the weeper-monkey of Brazil. See *Sapajou.*

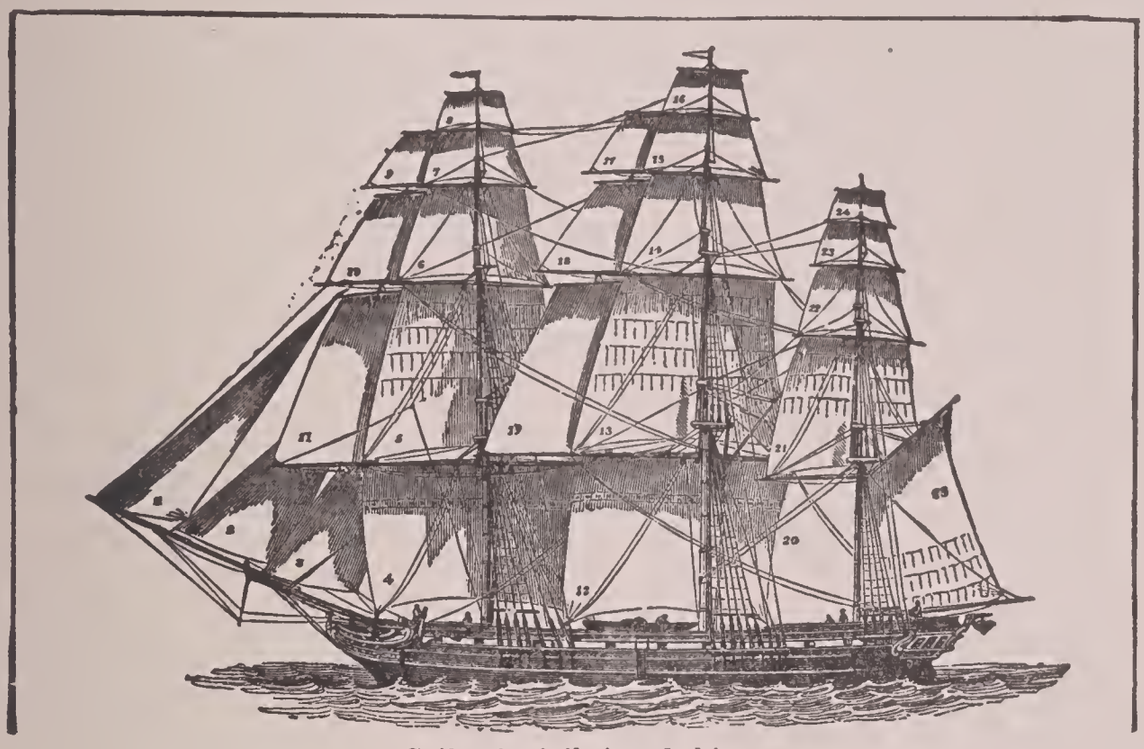
Saiga (sī'ga; *Antilŏpe Saiga*), a species of antelope found on the steppes of Russia and on the Russian borders of Asia. It forms one of the two European species of antelopes; the other species being the chamois. The saiga is about 2½ feet in height, with spiral horns, tawny colored in summer, light gray in winter.

Saigon (sī-gon'), capital of French Cochin-China, of which it is the chief trading emporium, on the right bank of the river of the same name, 35 miles from its mouth in the China Sea, one of the finest cities in the East. The bulk of the business is carried on in the suburb of Cholon. Saigon is connected by canal with the Me-kong, and by rail with Mytho, situated on one of the arms of that river. The Saigon River is navigable, even at ebb-tides, by the largest vessels up to the town, and an active trade with China, Siam, Singapore, Java, etc., is carried on, rice being the staple article of export. The population is estimated at 72,000, (1913).

Saikio. Same as *Kioto.*

Sail (sāl), a piece of cloth or tissue of some kind spread to the wind to impel or assist in impelling a vessel through the water. Sails are usually made of several breadths of canvas, sewed together with a double seam at the borders, and edged all round with a cord or cords called the *bolt-rope* or *bolt-ropes.* A sail extended by a yard hung by the middle is called a *square sail;* a sail set upon a gaff, boom, or stay, so as always to hang more or less in the direction of

the vessel's length, is called a *fore-and-aft sail.* The upper part of every sail is the *head,* the lower part the *foot,* the sides in general are called *leeches.* The lower two corners of a square sail are in general called *clues,* and are kept extended by ropes called *sheets.* Sails generally take their names, partly at least, from the mast, yard, or stay upon which they are stretched; thus, the main-course, main-top sail, main-topgallant sail, are respectively the sails on the main-mast, main-topmast and main-topgallant mast. The names of the sails shown in the above cut are: 1, flying jib; 2, jib; 3, fore-topmast staysail; 4, fore-course (or fore-sail); 5, fore-topsail; 6, fore-topgallant sail; 7, fore-royal; 8, fore-sky-sail; 9, fore-royal studding-sail; 10, fore-topgallant studding-sail; 11, fore-topmast studding-sail; 12, main-course (main-sail); 13, main-top sail; 14, main-topgallant sail; 15, main-royal; 16, main-sky-sail; 17, main-royal studding-sail; 18, main-topgallant studding-sail; 19, main-topmast studding-sail; 20, mizzen-course (cross-jack); 21, mizzen-top-sail; 22, mizzen-topgallant sail; 23, mizzen-royal; 24, mizzen-sky-sail; 25, spanker or driver. The vessel represented might, however, carry additional sails to those shown, in the shape of stay-sails, etc.; and in modern ships the top sails and topgallant sails are often divided into lower and upper. Sails are manipulated by ropes called the running rigging. See *Ship.*



Sails of a full-rigged ship.

Sailcloth, a strong linen, cotton, or hempen cloth used in making sails. The best is made of flax, and combines flexibility with lightness and strength.

Sail-fish. See *Sword-fish.*

Sailors' Snug Harbor, an asylum for aged and infirm seamen, on the north shore of Staten Island, in the city of New York. It has accommodations for about 1000 inmates, with beautiful buildings and grounds. Property in the heart of the city, bequeathed to it by Captain Richard Randall, has increased in value from $40,000 to about $20,000,000.

Sainfoin (sān'foin), a plant, *Onobrŷchis satīva,* nat. order Leguminosæ, a native of Central and Southern Europe and part of Asia. It has been in cultivation for centuries for the purpose of supplying fodder for cattle either in the green state or converted into hay. It is a prettty plant with narrow pinnate leaves and long spikes of bright pink flowers; stem 1½–2 feet high.

Saint Albans (sānt ąl'banz), a city, county seat of Franklin Co., Vermont, 3 miles E. of Lake Champlain, and about 25 miles N. by E. of Burlington. The shops and offices of the Central Vermont Railway are here. It has manufactures of clothing, cigars, etc., is the center of a rich farming country

and ships large quantities of milk, condensed milk, butter and cheese. Pop. (1920) 7582.

Saint Albans, a municipal borough and cathedral city in Hertfordshire, England, 20 miles northwest of London. It stands close to the site of the ancient *Varulamium*, and owes its name to St. Albans, the protomartyr of Britain. St. Michael's church contains a monument to Lord Bacon. Straw-plaiting and silk-throwing are the chief industries. Pop. 18,132.

Saint-Amand (saṇ-tȧ-mäṇ), a town in France, department of Nord, on the Scarpe, 7 miles N. by W. of Valenciennes. It is famous for its mineral springs, and has iron and steel works. Pop. 14,454.

Saint-Amand-Mont-Rond (-mąṇ-roṇ), a town of France, in department of Cher, on the Cher River. Pop. 8584.

St. Andrew, BROTHERHOOD OF, an organization of laymen in the Anglican Communion.

Saint Andrews. See *Andrews (St.)*.

Saint Anthony's Fire. See *Erysipelas.*

Saint-Arnaud (saṇ-tär-nō), ACHILLE LE ROY DE, a French marshal (1796-1854). He was created minister of war by Louis Napoleon, and was the chief tool in the *coup d'état* of December 2, 1851, receiving as reward the baton of a marshal. In 1854 he was commander of the French forces in the Crimea, but died from cholera a few days after the battle of Alma.

St. Augustine (ą'gus-tēn), a city, county seat of St. John's Co., Florida, on Mantanzas Bay; a fashionable health resort during winter. It is the oldest town in the United States, having been founded by the Spaniards about 1565. A few specimens of Spanish architecture remain, including the city gate, the fort of San Marco (now Fort Marion), etc. There are a number of large and handsome hotels, notably the Ponce de Leon. Pop. (1920) 6192.

Saint Bartholomew. See *Bartholomew.*

Saint Bernard (sānt ber'nard), a mountain pass in the Alps, between Piedmont and the canton of Valais, Switzerland. Its fame is due to its *hospice*, said to have been founded as a monastery in 962, by Bernard de Menthon, for the succor of travelers. The famous breed of St. Bernard dogs, used by the monks for the rescue of travelers across the icy pass, have been augmented by a Newfoundland stock. This pass was traversed by armies in Roman and mediæval times, but is chiefly notable for the passage of Napoleon's army in May, 1800.

St. Bernard, a city of Hamilton Co., Ohio, near Cincinnati, on the Miami and Erie Canal and on several railroads. It has fertilizer and soap works. Pop. (1920) 6312.

St. Boniface, a city of Manitoba, on Red River, opposite Winnipeg. It has lumber and planing mills, linseed oil mills, elevators, flour mills, etc. Pop. 11,500.

St. Catharines, a county town of Lincoln Co., Ontario, on Welland Canal. The Canadian Henley regatta is held here annually. Seat of Bishop Ridley College. It has water power from Niagara Falls, and numerous industries, including paper, flour and planing mills, metal and motor works, machinery and canning factories, etc. There are mineral springs and sanitarium. Pop. 19,500.

St. Chamond. See *Chamond, St.*

St. Charles, county seat of St. Charles Co., Missouri, on Missouri River, 14 miles N. W. of St. Louis. Home of Lindenwood College, for women; Sacred Heart Convent, etc. Has manufactures of shoes, flour, and foundry products; also extensive farming interests. Pop. (1920) 8503.

St. Christopher. See *Christopher, St.*

St. Clair, a river forming part of the boundary between Michigan and Ontario. It is the outlet of Lake Huron; length, 41 miles; flows into LAKE ST. CLAIR, a lake between Lake Huron and Lake Erie; 27 miles long, 25 wide, connected with Lake Erie by Detroit River.

St. Clair, a borough of Allegheny Co., Pennsylvania. Pop. (1910) 5640; (1920) 6585.

St. Clair, a borough of Schuylkill Co., Pennsylvania, 2 miles N. of Pottsville, in an anthracite coal region. Mining and the manufacture of miners' supplies are the principal industries. On Pennsylvania and Philadelphia & Reading railroads. Pop. (1920) 6495.

St. Clair, ARTHUR, an American soldier, born at Thurso, Scotland, in 1734. He was engaged in the sieges of Louisburg, 1758, and Quebec, 1759; settled in Pennsylvania, joined the revolutionary army and served as brigadier-general in the battles of Trenton and Princeton. He was made a major-general in 1777, was in command at Ticonderoga in that

year, and was in Washington's army at the siege and surrender of Yorktown. He was elected to Congress in 1785, was president of Congress in 1787, and was governor of the Northwest Territory 1789-1802. In an expedition against the Miami Indians in 1791, his army was defeated with heavy loss. He resigned his command in the army in consequence, and died near Greensburg, Pa., Aug. 31, 1818.

St. Cloud (sānt kloud), a city of Minnesota, capital of Stearns county, on the W. bank of the Mississippi river, 75 miles N. W. of St. Paul. It is the seat of a State normal school and a State reformatory institution. Water-power is here abundant and there are railroad shops and manufactures of flour, lumber, wagons, sleds, etc. The chief industry is the working of granite. Pop. (1910) 10,600; (1920) 15,873.

St. Cloud (sāṇ kloo), a town of France, on the Seine, in the western outskirts of Paris. Here was formerly the fine château of St. Cloud, belonging to the Duke of Orleans and a favorite residence of royalty. It was burned during the siege of Paris in 1870. The extensive park in which it stood is a splendid example of the work of Le Nôtre. Pop. 7316.

St. Croix (sānt croi), a river of Wisconsin, rises near the W. end of Lake Superior, flows S. W. and then S., becoming the boundary line between Minnesota and Wisconsin, and falls into the Mississippi 20 miles S. E. of St. Paul. Its whole length is 200 miles; an expansion of it near Stillwater, Wis., forming St. Croix Lake, 26 miles long and 2 miles wide. There are several falls in its course. St. Croix Falls, 55 miles from the Mississippi, interrupts navigation.—A river of the same name, 75 miles long, rises in Grand Lake, on the border between Maine and New Brunswick, and after a very winding course falls into Passamaquoddy Bay. It is navigable as far as Calais.

St. Croix (saṇt krwä), one of the Virgin Islands, bought from Denmark by the United States in 1917. It is the largest of the Virgin group, 84 square miles. The western portion is hilly, but the soil almost throughout the island is productive. It was discovered by Columbus in 1493. Pop. 16,000. Capital, Christiansted. The island is also called (incorrectly) SANTA CRUZ.

Sainte-Anne-de-Beaupré (saṇt-än-de-bō-prā), a village of Montmorency Co., Quebec, Canada, on north shore of St. Lawrence River, 20 miles E. of Quebec. It is the site of the famous shrine of Ste. Anne, which is attended annually by thousands of pilgrims and visitors. The beautiful church was destroyed by fire in 1922. Pop. (1921) 1648.

Sainte-Beuve (saṇt-*beuv*), CHARLES AUGUSTIN, a French writer, and one of the greatest of modern critics, born at Boulogne, Dec. 23, 1804; died at Paris, Oct. 13, 1869. He studied medicine at Paris, but abandoned that science in favor of literature, his first work of importance being on the French literature of the sixteenth century. His contributions to the *Revue des Deux Mondes* on French authors and literature formed for a considerable period the chief attraction of that periodical. In 1837 he delivered some lectures in the School of Port Royal at Lausanne, and these laid the foundation of his elaborate work, *Histoire du Port Royal* (1840-60). In 1840 he was appointed conservator of the Mazarin Library, and in 1845 admitted a member of the French Academy. After 1848 he contributed a number of critiques to the Monday numbers of the *Constitutionnel* and then of the *Moniteur* (*Causeries du Lundi*, 15 vols.; *Nouveaux Lundis*, 13 vols.). In 1852 he was appointed professor of Latin poetry in the Collége de France, but his views in favor of Napoleon III and imperialism rendered him unacceptable to a large section of the students, and he resigned; he also lectured for some years on French literature at the École Normale Supérieure. The cross of the Legion of Honor was bestowed on him in 1859, and the senatorship in 1865.

Sainte-Claire-Deville, HENRI, chemist, born in Saint Thomas, West Indies, in 1818. He studied in France; became professor of chemistry in the normal school, and won distinction by the invention of a method for producing the metal aluminum in considerable quantities, and for his demonstration of the dissociation of chemical compounds at high temperatures. He died in 1881. His brother CHARLES (1814-1876) was a geologist and published a *Geological Voyage to the Antilles and the Island of Teneriffe*, and other works.

St. Elias (-e-lī'as), MOUNT, a mountain of southeastern Alaska, about 25 miles from the Pacific ocean. It rises 18,100 feet above the ocean, and being completely isolated serves as a very important landmark. It was first ascended in 1897, by the Duke of the Abruzzi.

Sainte Marie. See *Nossi-Ibrahim*.

Sainte-Marie-Aux-Mines (sant-mà-rē-ō-mēn). See *Markirch.*

Saintes (sant), a town in W. France, department Charente-Inférieure, on the Charente. It has an old cathedral and interesting Roman remains. The manufactures are bombazine, earthenware, etc., and the trade is in brandy, wool and corn. Pop. 13,774.

Saint-Étienne. See *Étienne (St.).*

Saint Eustatius. See *Eustatius.*

Saint-Evremond (sant-āvr-mōn), CHARLES MARGUETEL DE SAINT-DENIS, SEIGNEUR DE, a French writer, born in 1613; died in 1703. At sixteen he entered the army, took part in many of the campaigns of the period, and rose to the rank of field-marshal, but gained his chief laurels in the salon of Ninon de l'Enclos as a brilliant conversationalist and a graceful wit. He was a staunch royalist, but, compromised by the disgrace of Fouquet, and afraid of Mazarin, he fled to England in 1661, and was welcomed and pensioned by Charles II. He was buried at Westminster Abbey. His satirical writings and his letters are of most interest. One of the former is his *La Comédie des Académistes.*

Saint Francis (sānt fran'sis), a river forming part of the boundary between Arkansas and Missouri, and entering the Mississippi about 9 miles above Helena. At high-water it is navigable for about 150 miles; total length 450 miles.

Saint Gall. See *Gall (St.).*

Saint Gaudens, AUGUSTUS, sculptor, born at Dublin, Ireland, in 1848; was brought in infancy to New York, studied art there and at Paris and Rome, opened a studio in New York in 1872, and produced *Hiawatha, The Puritan,* statues of Farragut and Lincoln, and other works. He designed the medal of award of the Columbian Exposition and other medals. He died August 3, 1907.

Saint Germain. See *Germain (St.).*

Saint Helena. See *Helena (St.).*

Saint Helens (hel'enz), a municipal and parliamentary borough in England, in Lancashire, 10 miles E. N. E. of Liverpool. Until a comparatively recent period an unimportant village, it is now a prosperous town. It owes its rise to the extensive coal-beds in the vicinity, and the introduction of various branches of manufacture, more especially that of glass. There are also important copper, iron, lead and chemical works, and potteries. Pop. 96,566.

Saint Helier. See *Helier.*

St. Henri (hen'ri), Quebec, Canada, on Grand Trunk Railway, is 3 miles from Montreal and a suburb of that city. Pop. 21,192.

Saint Hyacinthe (sānt hī'a-sinth), a city of Canada, province of Quebec, on the Grand Trunk Railway and the Yamaska and Black rivers, 35 miles E. N. E. of Montreal. It is a thriving place, and contains a Roman Catholic college and seminary, bishop's palace, etc. Pop. 9797.

Saint Jean, a town in the province of Quebec, Canada. Pop. (1911) 5903.

Saint John. See *Bolingbroke.*

Saint John, a city and port of Canada, province of New Brunswick, capital of St. John County, at the mouth of the river of the same name, which here enters the Bay of Fundy. It is built on rocky and irregular ground, and has a famous reversible falls. It was nearly destroyed by fire in 1877, the loss being estimated at $30,000,000. The harbor is commodious, spacious, never freezes and is well protected by batteries. Harbor improvements at Courtenay Bay were under construction in 1913 at a cost of $10,000,000. St. John is connected with Carleton, on the opposite side of the river, by a suspension bridge and a cantilever railway bridge. Portland, formerly a separate city, is now incorporated with St. John. St. John is the great commercial emporium of New Brunswick, and has in particular a great trade in lumber. The fisheries are very important, and there are a variety of other industries. Pop. 42,511

Saint John, a river partly belonging to the United States, partly to Canada, the last 230 miles of its course being in New Brunswick; total length 550 miles. It forms part of the boundary between Maine and the Canadian provinces of Quebec and New Brunswick. It is navigable for large steamers to Fredericton, a distance of 80 miles. About 225 miles up are the Grand Falls, 75 feet high. The city of St. John is at its mouth.

Saint John, CHARLES WILLIAM GEORGE, naturalist and sportsman, born in 1809; died in 1856. About 1834 he settled down to his favorite pursuits in the north of Scotland, and

published *Wild Sports and Natural History of the Highlands* (1846), *Tour in Sutherland* (1849), and *Notes of Natural History and Sport in Morayshire* (1863).

Saint John, JAMES AUGUSTUS, an English writer, born in 1801; died in 1875. In 1830 he published *Journal of a Residence in Normandy;* and a journey to Egypt produced *Egypt and Mohammed Ali, Egypt and Nubia,* and *Isis, an Egyptian Pilgrimage.* He was the author of a number of other miscellaneous works, including several novels.— His son, BAYLE ST. JOHN (1822–59), resided for several years in the East, and published books on Egypt, Turkey, etc., and a biography of Montaigne. Of two other sons, HORACE ROSCOE ST. JOHN (1832–88), wrote works on India, and PERCY BOLINGBROKE ST. JOHN (1821–89), traveled extensively in America, contributed fiction, notably Indian tales, to various periodicals, and was the author of over thirty novels.

Saint John, JOHN PIERCE, soldier and publicist, was born at Brookville, Indiana, in 1833. He served in the Civil war as captain and lieutenant-colonel. Settled in Kansas, was state senator 1873–74, and governor of Kansas 1879–83. He was the Prohibition candidate for President in 1884, obtaining a vote of 151,809.

Saint John, KNIGHTS OF. See *John (St.), Knights of.*

Saint John's, capital of Newfoundland, on Avalon Peninsula in the southeast. It is attractively situated at the inner end of an excellent and capacious harbor, and is protected by several strong batteries and forts. Great part of it consists of wooden houses. Cod and seal oils are produced and exported on a large scale. July 8, 1892, a terrible conflagration destroyed nearly two-thirds of the town; **loss about twenty millions of dollars.** Pop. 32,292.

St. Johnsbury, county seat of Caledonia Co., Vermont, 37 miles N. E. of Montpelier. The large plants of the Fairbanks Scales and Cary Maple Sugar companies are here; also branch of American Hoe & Fork Co. Pop. (1920) 8708.

St. John's College, CAMBRIDGE, a college founded in its present form by Margaret, countess of Richmond and Derby, mother of King Henry VII, in 1511. The chapel (1869) is by Sir Gilbert Scott, and is a fine specimen of the early decorated style. Ascham, Ben Jonson, Bentley, Herrick, Prior, Rowland Hill, Wilberforce, Wordsworth and Lord Palmerston, were members of the college.

St. John's College, OXFORD, a college founded in 1555 by Sir Thomas White, Knight, and alderman of London. It owes much of its splendor to subsequent benefactions. Archbishop Laud built the inner quadrangle, after a design by Inigo Jones, and furnished the library, one of the best in the university, with some of the most valuable books and all its manuscripts. His remains are buried within the college.

St. John's Wort (*Hypericum*), a genus of plants, order Hyperiaceæ. Numerous species (160) are to be found in various parts of the temperate zone, mostly as small showy shrubs. Yellow is the predominating color of the flowers, which are five-petaled. The leaves and blossoms, when rubbed between the fingers, emit a strong resinous-aromatic odor and have a bitter taste, due to a volatile oil, possessing astringent and tonic properties, and which held a prominent place in the old pharmacopœias. *H. perforātum,* to which formerly the name of St. John's wort was limited, has its leaves marked with pellucid dots, giving them a perforated appearance. *H. calycīnum,* popularly called Aaron's-beard, is a shrubby plant with handsome flowers, often planted in shrubberies, etc.

St. Joseph, capital of Berrien Co., Michigan, is on Lake Michigan, at the mouth of St. Joseph River. It is in the center of the Michigan fruit belt and fruit is shipped in large quantities. It has various manufactures and is a summer resort. Pop. (1920) 7251.

Saint Joseph, a city, county seat of Buchanan Co., Missouri, is on the Missouri River 60 miles N. N. W. of Kansas City; an important railroad and distributing center at the junction of the States of Missouri, Iowa, Nebraska and Kansas, with large jobbing and wholesale houses. It is one of the five great livestock markets; yards have daily capacity of 45,000 hogs, 20,000 cattle, 16,000 sheep, 2000 horses and mules. Its manufactures include boots, shoes, furniture, fixtures, candy, creamery products, flour, etc. Total output of industries (1919) $157,000,000. Flour and milling products in 1919 amounted to $17,000,000; mixed feed, $7,000,000. Pop. (1900) 102,979; (1910) 77,403; (1920) 77,939.

Saint-Just (san-zhüst), ANTOINE LOUIS LÉON FLOBELLE DE, one of the most prominent men in

the French revolution, born in 1767; executed in 1794. He adopted with enthusiasm the principles of the revolution, became the right hand of Robespierre, and one of the most energetic and resolute members of the Mountain party. He was an effective speaker, but unscrupulous and uncompromising. The guillotine was his general answer to all arguments and actions which did not harmonize with his own. He fell with Robespierre through the events of the 9th Thermidor (July 27, 1794; see *France — History*), and perished on the same scaffold with him on the following day.

Saint Kitt's. See *Christopher's (St.)*.

Saint Lawrence. See *Lawrence (St.)*.

St. Leger (sānt lej'er, or sil'in-jer), Barry, an English soldier in America. He fought under Abercromby (q. v.), took part in the siege of Louisburg (q. v.) and was with Wolfe (q. v.) at Quebec. He attempted to participate in the invasion of America by Burgoyne (q. v.), but was defeated at Oriskany (q. v.) August, 1777, and fled to Canada.

Saint Louis (san-lö'i), a town in Western Africa, capital of the French possessions in Senegambia, on an island of the same name at the mouth of the Senegal. St. Louis is the trade center of Senegal. Pop. 24,070.

Saint Louis (lö'i or lö'is), a city of Missouri, the commercial metropolis of the central Mississippi valley, is situated on the right bank of the Mississippi, 20 miles below the mouth of the Missouri, and 1149 miles by river (600 miles direct) from New Orleans. The city is laid out on the rectangular plan, the streets running N. and S., being numbered serially from the river. The greater part of it lies at an elevation of 400–500 feet above sea-level, and 200 above the river surface, the river-front being largely a levee, along which lie the numerous steamers engaged in the Mississippi river traffic. The magnificent Eads bridge, which crosses the river at this point, consists of three steel spans, each over 500 feet long. The Merchants bridge, confined to railroad service, is three miles farther up the river. The Municipal bridge, south of the Eads, has the longest span of any bridge of its type in the world. Among the railroads which enter the city are the Missouri Pacific, the Missouri, Kansas & Texas, the Burlington route, the Wabash, the Vandalia, the Louisville & Nashville, the Cleveland, Cincinnati, Chicago & St. Louis and several others. All these roads use the Union station, a colossal structure erected at a cost of $5,000,000. Of the thoroughfares of the city, the more important are Washington avenue, devoted largely to wholesale trade, and Broadway (Fifth) and Olive streets, on which are the more attractive retail stores. Among the notable buildings are the new city hall, in Washington Park, the court house, chamber of commerce, the Four Courts (an immense structure patterned after the Louvre of Paris), the fine arts museum and the coliseum, a very large edifice designed for concerts, conventions, etc., and capable of seating 15,000 persons. The Washington University is an important educational institution, others being the St. Louis University, (Roman Catholic), the St. Louis Medical College, the Forest Park University (for women), Christian Brothers College, the Public library and Mercantile library. There are a large number of beautiful churches and hundreds of magnificent residences, this city being noted as a city of homes. There are more than 2700 acres of public parks and pleasure grounds, the largest being Forest Park (1370 acres), and the most beautiful Tower Grove Park (276 acres), adjoining which is the splendid Missouri Botanical Garden. This city was the location of the Louisiana Purchase Exposition of 1904, the largest and in some respects the most beautiful world's fair ever held.

St. Louis, with its more than 20 important railroad lines and its command of the navigation of the Mississippi river, is a highly important center of distribution alike for agricultural and manufactured products and has a very heavy shipping trade in cotton, breadstuffs, live-stock, wool, metal products, coal, hides, etc. It is of note also as a drug market. Its manufactures are of great importance, chief among them being tobacco (this city being the largest tobacco mart in the world), and malt liquors (amounting to more than 100,000,000 gallons of beer per year). Very many other articles are produced. As an element in its live-stock trade, this city is the largest mule market in the world. St. Louis was settled in 1764 as a trading post for furs. It was in Louisiana, then just transferred by Spain to France and purchased by the United States in 1803. It was chartered as a city in 1822, soon after the admission of Missouri to the Union. In 1830 its population was 6694; in 1860, 160,773; in 1880, 350,518; in 1900,

575,238; in 1910, 687,029, and in 1920, 772,897. The tonnage passing through the Canadian and American canals at Sault Ste. Marie is three times greater than that through the Suez Canal.

St. Lucia. See *Lucia (St.)*.

St. Marys, a city of Auglaize Co., Ohio, on the Miami & Erie Canal and a river of the same name. The city has chain works, wheel works, machine shops, woolen and paper mills, etc. Pop. (1920) 5679.

St. Marys, a borough of Elk Co., Pennsylvania, 105 miles N. E. of Pittsburgh. There are saw and planing mills, tanneries, flour mills, pipe works, creameries, glass factories, etc. Lumber, coal and brick are among the industries. An academy of the St. Benedict Sisterhood is maintained here. Pop. (1920) 6967.

Saint Marys River, the channel connecting Lake Superior with Lake Huron, having more the character of a lake than a river. At Sault Ste. Marie, or St. Mary's Falls, there is a fall of 18 feet, and to enable vessels to avoid this a canal was constructed on the Michigan side in 1855, 1800 yards long and 12 feet deep, with two locks. The present Michigan Canal is 2330 yards long and 108 feet wide, with a huge lock 800 feet long and 100 wide, capable of accommodating vessels of 21 feet draught. A parallel canal on the Canadian side has a lock 900 feet long.

St. Mihiel (saṇ-mē-yel'), a town of France on the right bank of the Meuse and the Canal dé l'Est, 23 miles southeast of Verdun, in the department of Meuse. Its name comes from the Benedictine Abbey of St. Michael, founded here in 709. During the European war (q. v.), which began in 1914, the German troops forced the French back from the frontier, creating a wide salient south of Verdun, with the apex at St. Mihiel. The plan was to make a simultaneous thrust north of Verdun and bring the two armies together, thus enveloping the citadel. This plan failed, the northern army being unable to bend back the French line. The southern salient stretching out to St. Mihiel remained unaltered from its establishment in September, 1914, to September, 1918, in which latter year the American First Army, under General Pershing (q. v.), captured the town and forced the enemy out of the salient.

Following the great retreat of the Germans from their advanced positions in the spring and summer of 1918, Marshal Foch, in supreme command of the Allied armies, determined to make the attempt to destroy the long-held salient, which covered the most sensitive section of the enemy's position on the western front, namely, the Mezieres-Sedan-Metz Railroad and the Briey iron basin. The great task was entrusted to General Pershing, who had 15 American and 4 French divisions available.

On the night of September 11, the troops of the First Army were deployed in position. At dawn on September 12, after four hours of violent artillery fire of preparation, and accompanied by small tanks, the infantry of the First and Fourth Corps (commanded by Generals Liggett and Dickman respectively) advanced. The infantry of the Fifth Corps (commanded by Gen. Cameron) commenced its advance at 8 A M. The rapidity with which the American divisions advanced overwhelmed the enemy, and just after daylight on September 13, the attacking waves met at the village of Vigneulles, 18 kilometers N. E. of St. Mihiel, nearly sixteen thousand prisoners were captured and the famous salient was obliterated. The strength of the First Army in this battle totalled approximately 500,000 men, of whom about 70,000 were French. The Americans lost 7000; the enemy, 40,000. Pop. 9700.

St. Patrick. See *Patrick, Saint.*

Saint Paul (sānt-pạl'), a city of Minnesota, capital of the State and of Ramsey county, is situated on the Mississippi River, just below Minneapolis, the suburbs of the two cities being contiguous. It lies 350 miles N. W. of Chicago. It is at the head of navigation in the Mississippi, the Falls of St. Anthony being 9 miles above. It is built on both sides of the river, the two parts being connected by five handsome and substantial highway bridges. Owing to its favorable position it has grown in about 40 years from an insignificant depot into a fine city, and a great commercial and manufacturing center. It is surrounded by a complete network of railroads, and its situation on the Mississippi offers water communication of exceptional value. Manufactures include architectural iron, hoisting machinery, fur goods, railroad rolling-stock, flour, leather, boots and preserved provisions. There are also large railroad repair shops, foundries and general machine shops. An enormous jobbing trade is done here, covering Minnesota, the Dakotas, Idaho, Montana, Washington and northern Oregon. Among the buildings of note are the State capitol, Municipal auditorium, Roman Catholic cathedral, and National Guard armory. The educational institutions include the agricultural department of the State uni-

versity, Hamline University, Macalester College, etc., also the State Historical Library, whose collection is rich in American historical literature. Pop. (1900) 163,065; (1910) 214,744; (1920) 234,595.

St. Paul de Loanda. See *Loanda.*

St. Peter Port, or St. Pierre le Port, capital of Guernsey, on E. coast. Pop. 18,756.

St. Petersburg. See *Petrograd.*

St. Petersburg, a city of Pinellas Co., Florida, on Tampa Bay, 25 miles s. w. of Tampa. It has a fine harbor and is a noted summer and winter resort. Pop. (1910) 4127; (1920) 14,237.

Saint-Pierre. See *Pierre (St.).*

Saint-Pierre (saṇ-pi-ār), Jacques Henri Bernardin de, a French author, born in 1737; died in 1814. He learned engineering, and in the capacity of engineer worked in Malta, Russia, Germany, and for about three years for the French government in Mauritius. Having returned to France he betook himself to literature. His *Études de la Nature*, published in 1783, first secured him a literary position. Then followed his chief works: *Paul et Virginie* (1787) and *Chaumière Indienne* (1790), both of them (especially the former) highly popular. He was married twice when well advanced in years, each time to a young girl. In 1795 he was admitted to the Institute.

Saint-Quentin (saṇ-kaṇ-taṇ). See *Quentin (St.).*

Saints (sānts), a word used in the New Testament as a general term to designate all believers in the gospel of Jesus Christ. In a specific sense it signifies persons whose lives have been deemed so eminently pious that the Greek and Roman Catholic churches have authorized practices of commemoration and invocation in regard to them. The points involved in the Roman Catholic doctrine are the intercession of the saints and the utility of invoking them. According to the Council of Trent 'the saints reigning with Christ offer their prayers for men to God'; and it teaches that 'it is good and useful to call upon them with supplication, and in order to obtain benefits from God through Jesus Christ, who alone is our Redeemer and Saviour, to have recourse to their prayers, help and aid.' This help and aid is not expected to be given directly, but only through the favor the saints have with God, and through their intercession. As to how the saints are enabled to hear prayers addressed to them, there is no definite teaching. It is chiefly holy men who have died since the time of Christ that are spoken of as saints. The doctrine of saints, and the ideas and usages which grew out of them, form one of the main points of difference between the Protestants and the adherents of the above-mentioned churches. The Roman Catholics regard their beliefs on the subject of saints as supported by different parts of the Bible and the writings of many of the early fathers. Protestants generally object to the whole doctrine, alleging that not only is the idea of saints as intercessors nowhere contained in the Bible, but that it originated centuries after the establishment of Christianity; and that it is against the chief doctrine of Christianity, which declares all men to be sinners, and to be saved only by Christ. Countries, cities, arts, trades, orders, things, etc., have their *patron saints*, or saints who are supposed to be specially interested on their behalf; but the church, it seems, determines nothing in relation to them. St. Denis is the patron of France; St. George of England and Russia; St. Andrew of Scotland; St. Patrick of Ireland; Olaff of Norway; Canute of Denmark; Nepomuk of Bohemia; Cecilia of music; Hubert of hunting; Crispin of shoemakers, etc. See *Beatification, Canonization, Relics.*

Saintsbury (sāntz'bėr-i), George Edward Bateman, an English critic and historian, born in Southampton, October 23, 1845; matriculated at Merton College, Oxford University, in 1867. He published *A Short History of French Literature* (1882); *Essays on French Novelists* (1891); *A Short History of English Literature* (1898); *A History of Criticism and Literary Taste in Europe* (1900-04), etc. After gaining a high reputation as a critical writer he became professor of English literature at Edinburgh in 1895.

Saints' Days, are days set apart by traditional usage or authority of the church for anniversary celebrations in honor of particular saints.

Saint-Saëns (saṇ-soṇ'), Charles Camille, French composer and musician, born at Paris in 1835. In 1853 he became organist of the Church of St. Méry and was organist of the Madeline in Paris, 1858-77. His works include nearly every form of composition and though his operas have never become popular, his choral, orchestral and other vocal works are well known; as are also many of his symphonies, suites, concertos, etc.

THE HARBOR AT CHARLOTTE AMALIE

This beautiful and safe harbor is the chief port of the island of St. Thomas, Virgin Islands. Up to the time of the purchase of these islands by the United States from Denmark, they were known as the Danish West Indies. In early days it was a famous resort of the buccaneers who infested the Spanish Main.

Saint-Servan (saṇ-sèr-väṇ), a seaport town of Northwestern France, department of Ille-et-Vilaine, at the mouth of the Rance, near St. Malo. It is well built, has a good harbor and docks, and is a favorite seaside resort. It carries on steam-sawing, shipbuilding and rope-making. Pop. (1906) 9765.

Saint-Simon (saṇ-sē-mōṇ), Claude Henri, Comte de, founder of a philosophico-religious sect of socialists, was born at Paris in 1760. At the age of eighteen he entered the army, served in the closing campaign of the American war. He went to Holland in 1785, and to Spain in 1787 in connection with canal projects. He took no active part in the revolution which, indeed, caused him the loss of his own property; but he speculated in the national domains created by the confiscation of the landed property of the nobility and clergy, and thus by 1797 had realized a considerable fortune. He had by this time, it is said, conceived the idea of regenerating humanity, and in order to qualify himself for this great task he engaged in extensive studies, and traveled in England and Germany. He married in 1801, and in the course of a year ran through his fortune. After this he parted from his wife, and henceforth he lived in almost constant penury. During the ten years 1803-13 he wrote a number of works on scientific and political subjects, such as *L'Industrie ou Discussions Politiques, Morales et Philosophiques* (1817–18), and *Parabole* (1819). Augustin Thierry, Saint Aubin, and Auguste Comte, who had become his disciples, collaborated in these later volumes. Finding the difficulty of procuring the means of subsistence and of publishing his works increasing, he attempted suicide by shooting (1823), but recovered with a mutilated visage and the loss of an eye. He lived for about two years after this, dying in 1825. Previously Comte had separated himself from St.-Simon on account of the theological element which the latter grafted upon his socialistic doctrines, a change which led to the production of the *Catéchisme Industriel* (1824), and *Le Nouveau Christianisme* (1825), Christianity he now averred to be a progressive system, and, taking its fundamental principle of love, he held the church to be a complete organization of society for ministering to the wants of the whole, and especially of the more numerous and poorer classes. A social hierarchy based on capacities and services, with authority to divide heritages, distribute salaries, regulate vocations, and take all necessary means for making the labor of all contribute to the common good, was deduced from these premises by his disciples, who for a time formed a somewhat prominent sect. Society was divided by the St. Simonian doctrine into three classes, priests, savants and laborers, and was to be governed by the chiefs of the three classes. Capacity was to be the ground of distribution of functions. All property was to become on the death of the proprietor the property of the church or society.

Saint-Simon, Louis de Rouvroy, Duke de, a French writer, born in 1675; died in 1755. He was brought up on terms of intimate friendship with the Duke of Orleans, and when the latter became regent he was appointed a member of the regency council. From 1692–1702 St. Simon served in the army. He possessed the esteem and to some extent the confidence of Louis XIV, and of the Duke of Orleans, but his spirit of independence, severe morality and peculiar views about the mission of aristocracy, made him unpopular at the court. Nevertheless he succeeded in getting himself well informed about all the court cabals, and the doings and sayings of almost every notable personage of the France of the period. This information he deposited in his *Mémoires*, published posthumously, and which have made him famous. The first complete edition appeared in Paris in 1829–31.

Saint-Simonians. See *Saint-Simon.*

St. Thomas (sānt-tom'as), or S. Thomé, a West African island, in the Gulf of Guinea, belonging to Portugal. Area, 355 sq. miles; pop. 37,776; capital same name on the N. E. coast. There is a lofty mountain in its center, culminating in St. Thomas' Peak, over 6000 feet high. Coffee plantations have taken the place of the former sugar plantations; and cocoa, vanilla and cinchona are raised in increasing quantities. The climate is unhealthy for Europeans.

St. Thomas, a West Indian island, one of the Virgin group, belonging to the United States, 36 miles E. of Porto Rico. It possesses a fine climate, due to the trade winds. Area, 33 square miles. In Charlotte Amalie (q. v.) it possesses one of the finest ports in the West Indies. St. Thomas was colonized by the Danes in 1672. The English were in possession 1801-02, and 1807-15, the island again reverting to Denmark until 1917, when it was bought, together

with St. John and Ste. Croix (see *Virgin Islands*) by the United States. Pop. 10,000.

St. Thomas, a city and railway center of Ontario, Canada, capital of Elgin Co.; served by six railroads. It has large manufactures including car and car-wheels, wooden ware, shoes, farm implements, etc. Pop. 15,000.

St. Vincent (vin'sent), a British West Indian island, in the center of the Windward group. Area, 132 sq. miles; pop. about 44,500; capital, Kingston, on a bay of the same name near the S. W. extremity of the island, with a pop. of 4547. The center is mountainous (highest peak about 4000 feet), the soil in the valleys very fertile, and especially adapted for sugar cultivation. The climate is humid, yet healthy, and considered one of the finest in the West Indian islands. In the N. W. is an active volcano, called the Souffrière, about 3000 feet high, with an immense crater; an eruption in 1872 caused great damage in the island. Chief exports, sugar and arrowroot. St. Vincent was discovered by Columbus in 1498, and first became a British colony in 1763; between 1779 and 1783 it was held by the French.

St. Vincent, CAPE, a promontory forming the S. W. extremity of Portugal. It is celebrated in naval history for the great victory gained here in 1797 by the British admiral Sir John Jervis over a Spanish fleet nearly twice the strength of his own. Sir John was raised to the peerage under the title Earl of St. Vincent.

St. Vitus' Dance. See *Vitus* (*St.*).

Sais (sā'is), a ruined city of Egypt, near the right bank of the Rosetta branch of the Nile, 67 miles northwest of Cairo, formerly a place of great importance.

Sakhara (sâk-â'râ), a village of Egypt, where is the necropolis of ancient Memphis. It is remarkable for its ancient monuments, pyramids, etc.

Saki (sā'ki), the common name of several species of monkeys inhabiting South America, closely allied to the sapajous (which see), but differing from the latter in having non-prehensile tails. They are roughly subdivided into long and short-tailed sakis. They are all forest dwellers, gregarious, nocturnal, timid and live chiefly on honey and fruits.

Saki Cuxio (*Pithecia satanas*).

Sâl (säl), one of the most valuable timber trees of India, *Shorĕa robusta*, nat. order Dipteraceæ, growing to the height of 100 feet. Extensive forests of it exist in northern India, where it is largely used in carpentry of all kinds, the wood being light brown in color, hard and uniform in texture. It yields a whitish, aromatic, transparent resin (sometimes called dammar), used to caulk boats and ships, and also for incense. The sâl forests are now protected by government.

Sala (sâ'la), GEORGE AUGUSTUS, a journalist and author, born in London in 1827. His father was an Italian, and his mother an actress and singer of West Indian extraction. He studied for art, but early embraced literature. Under Charles Dickens he became a contributor to *Household Words*. Subsequently he assisted in founding *Temple Bar*, of which he was editor, and he became a voluminous contributor to the newspaper press, partly in the position of special correspondent. The *Seven Sons of Mammon*, and *Captain Dangerous*, are novels that appeared in *Temple Bar*. He traveled over great part of the world, knew the great capital cities by heart, and was an eyewitness of some of the most important ceremonials during the best part of his long life. The experiences of his travels, and the sights seen, he described in a style peculiarly his own; keen, vivacious, humorous. Much of his work was contributed to the *London Daily Telegraph*, but *All the Year Round*, the *Cornhill Magazine* and the *Illustrated London News* contain many productions from his pen. He died December 8, 1895.

Salaam (sa-läm'; Arabic, *selâm;* 'peace be with you'), the common salutation among Mohammedans.

Salad (sal'ad; French, *salade*, from Latin, *sal*, 'salt'), a preparation of raw vegetables or herbs, such as lettuce, endive, red or white cabbages, celery, cresses, radishes, shalots, onions, green mustard, dandelion, corn-salad, etc.: or of cooked beet-root, potatoes,

French beans, etc., with salt, vinegar, oil, sauces and spices. A great number of salads may be made by suitable combination of the materials mentioned, and still further variety is obtained by the admixture of different kinds of shredded meat, fish, eggs, sausage, lobster, crabs, prawns, shrimps, sardines, etc.

Saladin (sal'a-din), or properly SALAH-ED-DIN, a celebrated sultan of Egypt and Syria, born 1137; died 1193. His father, a native of Kurdistan, was governor of Tekrit (on the Tigris). He early distinguished himself as a soldier, became vizier to the last of the Fatimite caliphs in succession to his uncle Shirkuh, and on the caliph's death in Egypt (1171) Saladin usurped his wealth and authority, with the approval of Nureddin, the sultan of Damascus. After the latter's death (1173), Saladin succeeded also in possessing himself of Damascus and southern Syria. He rapidly extended his conquests over Syria and the neighboring countries, and thus came in contact with the Crusaders during the Third Crusade. The disastrous defeat he suffered from the Crusaders in 1177 compelled him to return to Egypt, but in 1182 he resumed his career of conquest. In 1187 he gained the famous victory of Tiberias, and Jerusalem surrendered to him after a gallant resistance. But the fall of Acre in 1191 after a two years' siege, and the defeats at the hand of Richard I, compelled Saladin to conclude a truce (1192), which was followed by the withdrawal of Richard. About a year after this event Saladin died at Damascus. He was a skilful, brave and magnanimous general; and an astute, beneficent and merciful ruler. Saladin was the founder of the dynasty of the Ayoubites. See *Crusades*.

Salado (sa-lä'thō), a river of the Argentine Republic, which rises on the eastern slopes of the Cordilleras, and falls into the Paraná after a course of 750 miles.

Sal Aëratus, SALERA'TUS (sal-a-rā'-tus), an American name for a baking-powder, prepared from carbonate (or bicarbonate) of soda and salt.

Salamanca (sal-ȧ-man'kȧ), a city in Spain, capital of a province of the same name, 120 miles northwest of Madrid, on and between three hills, and on the river Tormes, here spanned by a fine bridge of twenty-six arches, the greater part of which is of Roman origin. In picturesqueness, and in the magnificence of its ancient edifices, Salamanca is hardly surpassed by any other Spanish city. Chief among the numerous attractions rank the cathedral (sixteenth century), a splendid example of florid Gothic; the old cathedral, erected 1102, in Romanesque style; the university, the College of the Jesuits, King's College and churches. The university is one of the oldest and most celebrated in Europe, and when at its zenith in the sixteenth century attracted some 15,000 students from all parts of Europe. Besides a number of interesting monastic buildings, there are also some large and elegant palaces and private mansions. The Plaza Mayor is a magnificent square. *Salmantica*, the ancient Salamanca, was taken by Hannibal in 222 B.C., and under the Romans it became a military station. It has been the theater of many interesting historic events, including the victory gained in its vicinity in 1812, by the Duke of Wellington, over the French under Marshal Marmont. Pop. 33,082.—The province of SALAMANCA, chiefly formed by the Douro basin, has an area of 4829 sq. miles; pop. 333,790.

Salamanca, a city of Cattaraugus Co., New York, on Allegheny River, 63 miles s. of Buffalo, on the Erie, Pennsylvania and other railroads. It has furniture and mirror factories, woolen mills, tanneries, veneer and panel plant, car shops, etc. Pop. (1920) 8276; with environs, 12,000.

Salamander (sal-a-man'dėr), the name given to various animals included in the class Amphibia (frogs, toads, newts, etc.), and in the order Urodela ('tailed') of that class. The salamanders may be divided into the land salamanders (genus *Salamandra*) and the water salamanders, efts or newts. The land salamanders have an

Common Salamander (*Salamandra vulgāris*).

elongated lizard-like form, four feet and a long tail. The skin is warty, with many glands secreting a watery fluid, which the animal exudes when alarmed. As this fluid is injurious to small animals the salamanders have the reputation of extreme venomousness, though they are in reality entirely harmless. The best-known species is the *Salamandra vulgāris*,

the common salamander of Europe. It is 6 to 8 inches long, is found in moist places under stones or the roots of trees, near the borders of springs, in deep woods, etc., and passes its life in concealment except at night or during rain. It is sometimes called the *spotted salamander*, from the bright yellow stripes on its sides. There are various other species in Europe, Asia and America. In America the name is often given to the menopome (*Menopoma allegani*ense). Salamanders feed on worms, slugs, snails and insects. The old legend that salamanders could live in the midst of fire is, like their venomousness, a fiction, although it is possible that the watery secretion of the skin might enable these animals to resist heat with impunity for a longer period than other forms.

Salamis (sal'a-mĭs), or KOLURI, an island of Greece, in the Gulf of Ægina, close to the shore of Attica. It has a rocky surface, with a thin but not unproductive soil, and in some parts is well adapted for the olive and vine. The celebrated battle, B.C. 480, in which the vast and unwieldy Persian fleet under Xerxes was signally defeated by a much smaller Grecian fleet, was fought here.

Sal-ammoniac (sal-a-mōn'i-ak), the chloride of ammonium, now generally obtained from the refuse of gas-works. It is used in calico-printing, in galvanizing iron, in soldering, etc. See *Ammonia*.

Salangane (sal-an'gān), a species of swift (*Collocalia fuciphaga*) common throughout the Eastern Archipelago, and famous as the producers of the 'edible birds' nests.' See *Birds' Nests, Edible*.

Salawatty (sä-la-wä'tē), an island off the western extremity of New Guinea, to the Dutch portion of which it is regarded as belonging; area about 750 sq. miles. Pop. 3000.

Saldanha Bay (sal-dan'ya), a bay of the Atlantic, on the west coast of Cape Colony, South Africa, 80 miles N. of Cape Town. It forms a fine natural harbor, with excellent shelter and anchorage at all seasons, but scarcity of water and fuel causes it to be little frequented.

Sale (sāl), GEORGE, oriental scholar, was born in 1680; died in 1736. He was a lawyer by profession, and a contributor to several important publications; but he is best known by his translation of the *Koran*, which appeared in 1734.

Sale, SIR ROBERT HENRY, a British major-general, born in 1782; died in 1846. He entered the army at a very early age, and his brilliant military career supplies some stirring pages in the history of the British Indian Empire of the first half of this century. In India, Burmah, Afghanistan, wherever he was employed, he distinguished himself, especially in Afghanistan, where he forced Dost Mohammed Khan to surrender, and inflicted a crushing defeat upon Akbar Khan at Jelalabad (1842), subsequently assisting in the recapture of Cabul.

Salem (sā'lem), a city of Columbiana Co., Ohio, 20 miles S. S. W. of Youngstown. It is in a coal-mining and rich agricultural region. Its industries include flour mills, machine shops, sheet-metal, steel and wire work, manufactures of steam and gas engines, tools, pumps, etc. Pop. (1920) 10,305.

Salem, a city and seaport of Essex county, Massachusetts, about 17 miles N. N. E. of Boston, on the main line of the Boston and Maine railroad; in the famous North Shore district of Massachusetts, a summer resort region. Salem formerly had a considerable foreign trade, especially with the East Indies and China, and has still a large coasting trade, while its manufacturing industries are in a flourishing condition, including cotton and leather goods, boots and shoes, boats, toys, steam, gas and water specialties, machinery, carriages, medicine, etc. Salem has many interesting buildings, including the East India Marine Museum, the Peabody Academy of Sciences, the Athenæum and the Essex Institute. It played a prominent part in the earliest history of the States, being founded in 1628. Among its interesting remains is the house where Roger Williams dwelt, and First Church, the oldest Protestant Church in America. Salem was the birthplace of Nathaniel Hawthorne and Joseph H. Choate. Pop. 42,529.

Salem, a city, county seat of Salem Co., New Jersey, on Salem River, 37 miles S. S. W. of Camden, is the business center and shipping point of a fertile farming district; has catsup factories, brass and iron works, glass and linoleum factories, etc. Pop. 7435.

Salem, the capital of Oregon, county seat of Marion Co., on the navigable Willamette River and on the Southern Pacific and Oregon Electric railroads, 53 miles S. by W. of Portland. Its main industries are the manufacture of fruit juice and a large dehydration plant. It has four canneries for fruits and berries and the manufacture of loganberry juices; also prune packing plants, Salem being the center of the prune industry of the Northwest. It has a $1,200,000 paper mill. Other industries include foun-

dry products, doors, sash, etc. It has a fine Capitol and various State institutions. Seat of Willamette University (founded 1844). Pop. (1910) 14,094; (1920) 17,679.

Salem, a district and town of India, in Madras province. Area of district, 7653 square miles; pop. 2,204,974. Population of the town of Salem, the capital of the district, 59,152.

Salep (sal'ep), obtained from the tuberous roots of several species of orchis, especially *O. mascŭla*, and the finest is obtained from Asia Minor. It occurs in commerce in small oval balls of a whitish-yellow color, of a horny aspect, hard, with a faint peculiar smell, and a somewhat insipid taste. It is much valued in the East for its supposed general stimulant and nutritious properties. For use it is ground into a fine powder, and mixed with boiling water, sugar and milk being added according to taste. It is to some extent used in Europe as a food for weakly persons.

Salera'tus. See *Sal Aëratus.*

Salerno (sȧ-lėr'nō; anciently *Salernum*), a town and seaport of Italy, capital of the province of the same name, on the Gulf of Salerno, 30 miles southeast of Naples, finely situated on the side and at the foot of a hill, crowned by the remains of an ancient Norman citadel. It has an excellent marine promenade, and a cathedral dating from the eleventh century. Its university (established 1150, abolished 1817) was famous in the middle ages, especially in medicine. Its well-sheltered port has recently been much improved. It was a place of great importance under the Romans, Goths, Lombards and Normans. Silk and cotton are manufactured. Pop. 42,727.—The province has an area of 2126 square miles, and a pop. of 566,870.

Sales (sȧl, sālz), Saint François de, Bishop of Geneva, was born of noble parents at the castle of Sales, near Annecy, Savoy, in 1567; died in 1622. He received his higher education at a Jesuit college in Paris, and finally devoted some years to the study of jurisprudence at Padua. Early in life he showed a decided predilection for the clerical life, and, against his father's desire, took orders in 1593. Geneva became the scene of his ecclesiastical work, and here, as dean, coadjutor bishop (1598), and bishop (1603), he spent the best part of his life. His eloquent, yet simple and persuasive sermons, and his exemplary life, exercised a powerful influence for the benefit of his church. His writings were much valued, and some of them have been translated into all the leading languages of Europe. The best known is his *Introduction to a Religious Life.* In 1665 he was canonized by Pope Alexander VII.

Salesian Nuns (sal-es'i-an) the nuns of the order of the Visitation of the Virgin Mary, founded by François de Sales (see above), and his friend Madame de Chantal, one of his disciples, in 1610, at Annecy, in Savoy, as a refuge for widows and sick females. In the eighteenth century there were 160 convents and 6600 nuns of this order. There are still Salesian nuns in the principal cities of Italy, devoting themselves to the healing of the sick and the education of young girls.

Saleyer Islands (sa-lī'er), a group of islands in the Indian Ocean, south of Celebes, from which Great Saleyer is separated by the Saleyer Strait. They are about thirty in number; have a pop. of about 80,000 Mohammedan Malays governed by native rajahs under a Netherlands agent. Ebony, teak, indigo, coffee, earth-fruits and cotton, are among the products.

Salford (sąl'ford), a municipal and parliamentary borough of England, in Lancashire, which may be considered an integral portion of Manchester, though it has a mayor and corporation of its own, and a distinct parliamentary constituency returning three members. Among its buildings may be mentioned the law courts and the railway station. Pop. (1911) 231,380. See *Manchester.*

Salians (sa'li-anz), or Salian Franks, is the name given to that section of the Franks who from the third to the middle of the fourth century were settled on the left bank of the Lower Rhine. Their origin is uncertain, but we know that the earliest Frankish kings were Salian Franks.

Salicaceæ (sal-i-kā'se-ē), a nat. order of apetalous exogens, distinguished by a two-valved capsule, and numerous seeds tufted with long hairs. The species are trees or shrubs, inhabiting woods in the northern districts of Europe, Asia and America. Only two genera are included in the order, *Salix* or willow, and *Populus* or poplar.

Salicine (sal'i-sin), a bitter crystalline substance obtained from the bark of willows, and used in medicine, especially in the treatment of rheumatic fever, also in neuralgia and neuralgic headaches.

Salic Law (sal'ik), the code of laws of the Salian Franks. One of the laws in this code excluded women from inheriting certain lands,

probably because certain military duties were connected with the holding of those lands. In the fourteenth century females were excluded from the throne of France by the application of this law to the succession to the crown, and it is in this sense that the term *salic law* is commonly used.

Salicylic Acid (sal-i-sil'ik), an organic acid of a sweetish-sour taste, without smell, possessing great antiseptic and anti-putrefactive properties. It occurs in nature in the flowers of the meadow-sweet, and in the whortle-berry; but that preferred by the medical profession is procured from the oil of the winter-green (*Gaultheria procumbens*). There are now several processes for manufacturing salicylic acid on a large scale, and it forms an important article of commerce. It is largely employed in medicine, having properties similar to those of quinine, and is given in acute and chronic rheumatism, used as a lotion in irritation of the skin, etc. A salt prepared from it, salicylate of sodium, is often preferred.

Salina (sȧ-lī'nȧ), a city, seat of Saline Co., Kansas, on the Union Pacific Railroad, 18 miles E. of Monterey. There are salt springs and gypsum quarries in the vicinity, and it is the commercial center of a farming and stock-raising region. It has grain elevators and various manufactures. Here is the Kansas Wesleyan University and other educational institutions. Pop. (1910) 9688; (1920) 15,085.

Salina Cruz, a town of the State of Oaxaca, Mexico, near Tehauntepec, of which it is the port. It is the Pacific terminus of the Tehauntepec Railway. Its open roadstead has been made into a safe harbor by two great converging jetties. The railroad service is giving it a rapid growth.

Salina Formation, the name given in the United States to a subdivision of the Silurian system in geology. It appears to correspond with the lower portion of the Ludlow rocks of the British series.

Salins (sȧ-lan; ancient, *Salinæ*), a town of France, department of the Jura. It owes its name to saline springs which were worked by the Romans, and still form the chief wealth of the town. Pop. 4358.

Salisbury (sąlz'be-ri), or NEW SARUM, an ancient city of England, capital of the county of Wilts, 80 miles southwest by west of London, at the junction of the Upper Avon with the united streams of the Willey, Nadder and the Bourn. The city, which is regularly laid out, is chiefly interesting for its historic associations and antiquities, and for its magnificent cathedral, built between 1220 and 1258, entirely in the early English style, and on a uniform and well-arranged plan. The spire (404 feet) was added between 1335 and 1375, and is the highest in England. Salisbury was at one time celebrated for its woolen manufactures and fine cutlery, but these industries are now all but extinct. Pop. (1911) 21,217.

Salisbury, a city, county seat of Rowan county, North Carolina; in the heart of a rich farming country, the Piedmont Section. It has large railroad shops, granite works, cotton mills, lumber plants, mattress plant, flour mills, iron and metal works, oil mills, etc. Pop. (1920) 13,884.

Salisbury, a town, seat of Wicomico Co., Maryland, on the Wicomico River, 32 miles E. N. E. of Crisfield. It has a railroad repair shop and canning and other factories. Pop. (1920) 7553.

Salisbury, EARL OF. See *Cecil.*

Salisbury, ROBERT ARTHUR TALBOT GASCOYNE CECIL, THIRD MARQUIS OF, English statesman, was born at Hatfield (county of Herts) in 1830, and educated at Eton and Oxford. As Lord Robert Cecil he entered Parliament as member for Stamford in 1853, and gradually made his way till in 1866, on the formation of Lord Derby's third

Marquis of Salisbury.

administration, he was appointed secretary of State for India. In 1865 he became Lord Cranborne and heir to the marquisate, on the death of his elder brother. Owing to difference of opinion on the subject of the franchise he retired from the ministry, but on the death of his father in 1868 and his consequent ele-

vation to the House of Lords he returned to his old party associations. He resumed the secretaryship for India in the Disraeli government of 1874. He took part in the conference of Constantinople, which was expected to settle the dispute between Russia and Turkey; and at the end of that war, having become foreign minister, he insisted on the treaty which Russia had forced on Turkey being submitted to a congress of the powers. In 1878 he accompanied Disraeli to the congress at Berlin, and on the death of that statesman became the recognized leader of the Conservative party. He became premier as well as foreign secretary on the fall of the Gladstone government in 1885. Gladstone succeeded again to power in the end of the same year, but in the June following was defeated on the Irish bills (see *Ireland*), when Salisbury again became premier and foreign secretary. His party maintained a majority by means of the adherence of the Liberal Unions, who were represented in the cabinet by Mr. Goschen. In 1892, the majority in Parliament being in favor of a Home Rule bill for Ireland, Salisbury retired from office. In 1895, on the fall of the Rosebery ministry, he was recalled. He was again returned to office in 1900, resigning in 1902. He died Aug. 23, 1903.

Salisbury Plain, a tract of downs and heath in Wiltshire, England, between Salisbury and Devizes. It is about 20 miles in length (north to south), and 14 broad (east to west). Upon it, about 8 miles north of Salisbury, is Stonehenge (which see).

Saliva (sa-lī'va), the transparent watery fluid secreted by glands connected with the mouth. The quantity secreted in twenty-four hours varies; its average amount is probably from 1 to 3 pints. The purposes served by saliva are mechanical and chemical. It keeps the mouth in a due condition of moisture, and by mixing with the food during mastication it makes it a soft pulpy mass, such as may be easily swallowed. The chemical action of saliva on the food is to convert the starchy elements into some kind of sugar. The salivary *glands* are compound tubular glands known as the *parotid*, the *sub-maxillary*, and the *sublingual*, and numerous smaller bodies of similar structure, and with separate ducts, which are scattered thickly beneath the mucous membrane of the lips, cheeks, soft palate and root of the tongue. Salivary glands are absent in some mammals and reptiles, and in most fishes.

Salivation (sal-i-vā'shun), a superabundant secretion of saliva, either determined locally by the use of masticating irritants, or by means which act upon the whole system, especially by mercurial preparations. In the last case it is accompanied by a coppery taste, by swelling of the gums and sometimes by looseness of the teeth.

Salix (sā'liks). See *Willow*.

Sallee (sâ-lā'), a fortified seaport on the western coast of Morocco, on the Atlantic, 106 miles west of Fez, at the mouth of the Buregreb, formerly a stronghold of Moorish piracy. On the opposite side of the river stands Rabat (which see). Pop. about 12,000.

Sallow (sal'ō), a common name for several species of willow. See *Willow*.

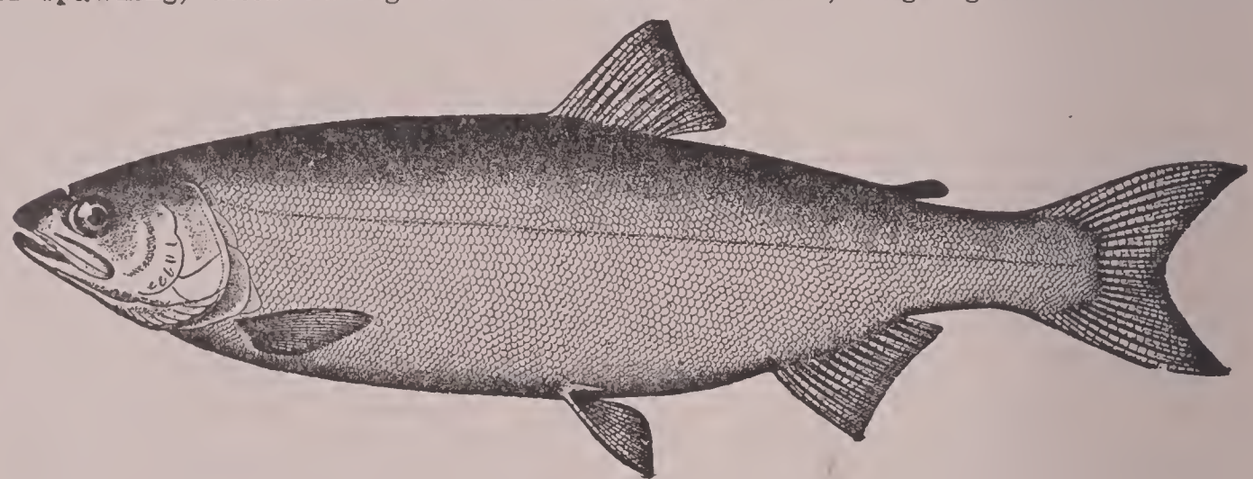
Sallow-thorn (*Hippophaë*), a genus of plants of the nat. order Elæagnaceæ. *Hippophaë rhamnoides*, an European species, is a spiny shrub with diœcious leaves and small orange-colored berries, growing on cliffs near the sea.

Sallust (sal'ust), Caius Sallustius Crispus, a Roman historian, born B.C. 86, at Amiternum; died at Rome B.C. 34. He became tribune in B.C. 52, and in the civil war sided with Cæsar. In B.C. 47 he was prætor elect, and in the following year accompanied Cæsar to the African war, where he was left as governor of Numidia. He returned with immense wealth, was accused of maladministration and oppression, and after Cæsar's death lived in luxurious retirement. Sallust wrote several historical works in a clear and concise style. His *Bellum Catilinarium* is a history of the Catiline conspiracy. The *Jugurtha*, or *Bellum Jugurthinum*, is a history of the war against Jugurtha, king of Numidia, from B.C. 111 to B.C. 106.

Sally-port, in fortification, a postern, or a passage underground from the inner to the outer works, to afford free egress to troops in making a sally, closed by massive gates when not in use.

Salmasius (sal-mā'shi-us), Claudius (the Latinized name of Claude de Saumaise), a French scholar, born in 1588; died in 1653. In 1651 he succeeded Joseph Scaliger as professor in Leyden University. In 1649 he wrote a defense of Charles I (*Defensio Regia pro Carolo I*), which was brilliantly answered by Milton's *Defensio pro Populo Anglicano*. His other important works are: *Plinianæ Exercitationes in Solinum; Scriptores Historiæ Augustæ; De Mutuo; Observationes in Jus Atticum et Romanum*, etc.

Salmon (sam'un; *Salmo salar*), a well-known fish, forming the type of the family Salmonidæ (which see). The salmon inhabits both salt and fresh waters, and ranks prominent among the food-fishes of the United States and other countries. It generally attains a length of from 3 to 4 feet, and an average weight of from 12 to 30 lbs., but these limits of size and weight are frequently exceeded. The typical color of the adult fish is a steel-blue on the back and head, becoming lighter on the sides and belly. Teeth are present in the upper and lower jaws, palate, and vomer or roof of the mouth; the edges of the tongue are also toothed or notched. The food consists of animal matter, and must vary with the changes of habitat from salt to fresh water, and *vice versa*. In the autumn the salmon quits the sea and ascends the rivers for the purpose of spawning, often having to surmount



Red Salmon.

considerable obstacles such as falls of some height, in its progress. In many streams they are now assisted in this by artificial structures known as 'salmon-ladders,' or the like. The eggs are deposited in a shallow trough or groove excavated in the gravelly bed of the river. After spawning, the salmon, both male and female, return to the sea under the name of *spent-fish*, *foul-fish*, or *kelts*, the females being further distinguished as *shedders* or *baggits*. In from 70 to 150 days the young fish emerges from the egg, and in its embryo state it is not unlike a tadpole, being on the average about one and a quarter inches in length. About 50 days later it assumes the appearance of a fish and now approaches the definite or *parr* stage of its existence, beginning to be marked by transverse bars of dark color. It usually continues in the shallows of its native stream for two years after hatching, and during this period it attains a length of 8 inches. When the season of its migration arrives, generally between March and June, the fins have become darker and the fish has assumed a silvery hue. It is now known as a *smolt* or *salmon fry*. The smolts now congregate into shoals and proceed leisurely seaward. On reaching the estuary they remain in its brackish water for a short time and then make for the open sea. Leaving its native river as a fish, weighing frequently not more than 2 ozs., the smolt, after three months' absence, may return to fresh water as a *grilse*, weighing 4 or 5 lbs. In the grilse stage or *salmon peel*, as it is sometimes called, the fish is capable of depositing eggs. After spawning in the fresh water the grilse again seeks the sea in the autumn, and when its second stay in the ocean is over it returns after a few months' absence as the adult salmon, weighing from 8 to 10 lbs. The salmon returns as a rule to the river in which it passed its earlier existence. The fertility of the fish is enormous; it has been calculated that over 150,000,000 of salmon ova are annually deposited in the Scotch river Tay alone, and of these only about a third come to life and attain the parr stage, while of these parrs only 20,000,000 become smolts; and in time only 100,000 remain as perfect salmon, of which 70,000 are caught and 30,000 left for breeding purposes. Salmon are caught by the rod, and by means of nets. For purposes of commercial supply they are taken in nets of special construction and of various forms, the fishing being regulated by law not only as to their seasons and times, but also as to the forms and dispositions of the machines for the capture of the fishes. In Europe the fish is found between the latitudes of 45° and 75°, in North America in corresponding

latitudes. The flesh of the salmon when fresh is of a bright orange color, and is of highest flavor when taken from the sea-feeding fish. Of the same genus as the common salmon is the salmon-trout, the common river-trout, Lochleven trout, etc. What is known as the 'land-locked' salmon, which is found in Norway, Sweden, Maine and New Brunswick, and is so called because it remains in inland waters and does not descend to the sea, is by some regarded as a distinct species from the common salmon, by others not. In the waters of Northwestern America are several salmon belonging to a distinct genus, *Oncorhynchus*, including the quinnat, or Chinook salmon, blueback or red-fish salmon, silver salmon, humpback and dog-salmon. The Chinook salmon, for which the Columbia River is famous, starts to come to the mouth of the river from the ocean as early as February or March, but the season for catching them does not open until May 1st, which allows large numbers to get up stream to their spawning grounds. Those which enter the river first go to the headwaters, many of them getting to spawning grounds in the Sawtooth mountains in Idaho, more than 1000 miles from Astoria, Oregon. There is no other species of fish equaling the Royal Chinook salmon in commercial value. It reaches a great size; fish have been taken weighing 80 pounds, and 50 to 60 pounders are not infrequent catches. The blueback, or sockeye, is next in importance. It abounds in the Fraser River and in all the streams of Alaska. The silver salmon occurs in Puget Sound, where all species of salmon are found. The Sacramento has all but the blueback. The dog salmon is found mostly in northern streams, and in Japan. Salmon canning is one of the most important industries on the Pacific coast. The chief fish product of the waters of the Puget Sound is salmon, the average annual production of which during the last few years has had a value of more than $73.000,000.

Salmonidæ (sal-mon'i-dē), a family of teleostean fishes, belonging to the subdivision Malacopteri of that order. To this family belong the various species of salmon (see *Salmon*), the trouts, the char, the grayling, the smelt, the vendace, white-fish of America, etc. The Salmonidæ are abdominal Malacopteri, in that their ventral fins are placed backwards on the belly. The body is covered with cycloid scales; the head is naked, and there are no barbels. The belly is rounded, and there is a small adipose fin behind the dorsal. Pyloric appendages of the stomach are generally numerous and rarely absent. The air-bladder is large and simple. The ova fall into the cavity of the abdomen.

Salmon-trout, or SEA-TROUT (*Salmo trutta* or *S. crioæ*), a species of salmon which grows to a length of 3 feet, and is numerous in some of the British rivers. It resembles the salmon in form and color, and is, like it migratory, ascending rivers to deposit its spawn. It is plentiful, though smaller in size, in the waters of North America and is allied to the weak-fish.

Salonica (sä-lō-nē'ka; ancient, *Thessalonīca*; Turkish, *Selanik*), a large seaport in the Balkans, formerly in the Turkish empire but incorporated in the Hellenic kingdom under the Treaty of Bucharest in 1913. It is situated on a gulf of the Aegean Sea, 140 miles s. of Sofia, 315 miles w. s. w. of Constantinople, and rises from the sea in the form of an amphitheater. Its harbor is excellent and its roadstead well sheltered. Principal exports: cotton, corn, leather, silk, carpets, bricks and soap. There are many splendid mosques in the city, some of them dating from the fourth century. St. Paul preached the Gospel here, and addressed two of his epistles to the Christian converts of the place, then called Thessalonica. Great Britain and France occupied Salonica in 1915 during the European war, while Greece was neutral. Later events, which culminated in the abdication of King Constantine and the rise to power of Venizelos, the former premier and an avowed republican, brought Greece into the war. Population 160,000.

Salop, COUNTY OF. See *Shropshire.*

Salpa (sal'pa), a genus of ascidian or tunicate mollusca forming the representative example of the family Salpidæ. These animals are found floating in the Mediterranean and the warmer parts of the ocean, and are protected by a transparent gelatinous coat, perforated for the passage of water at both extremities. They are frequently phosphorescent, and are met with in two conditions known as *single* and *chain salpæ*. Each salpa is of oval or quadrate form, and the organs of the body occupy a comparatively small space within the body-cavity. *Salpa maxima* is the most familiar species.

Salpingotomy (sål-pin-jot'u-mi) is the operation of cutting the *Fallopian tube* (which see) in the female. It is recommended and used to produce sterility in criminal, imbecile, and insane females to prevent propaga-

tion of such undesirable elements. It is a legal operation on these classes in eight States. Like *vasectomy* (*q. v.*), it is a distinct advantage to the person operated upon, as well as to the community.

Sal Prunella (sal-prö-nel'a), niter which has been fused and cast into cakes or balls, and used for chemical purposes. See *Niter.*

Salsafy (sal'sa-fi; *Tragopogon porrifolius*), belongs to the nat. order Compositæ, and is allied to the endive and dandelion. It is cultivated for the use of its long, white, fleshy roots, which are cooked and served in various ways. It is also known, from its peculiar flavor, as the oyster plant. The leaves are narrow and long; the flowers are solitary and terminal, with violet purple corollas. See *Goat's Beard.*

Salse (sals), an eruption of hot acidulated mud from a small orifice, generally in volcanic regions, and frequently accompanied by steam and gases at a high temperature, which act powerfully on the surrounding solid matters, disintegrating and decomposing them, and forming new compounds. In some districts the gases are inflammable, and flames issue from the orifices.

Salsette (sal-set'), a large island to the north of Bombay, and connected with Bombay island by bridge and causeway; area, 241 square miles. (See *Bombay.*) A broad range of hills runs along the center of the island from north to south, while the lowlands are much intersected by tidal creeks. There are no large fresh-water streams; but the supply of water from wells is of fair quality, and pretty constant. The staple crop is rice, and most of the uplands are reserved for grass for the Bombay market. The coast abounds in cocoanut groves, and the palmyra palm grows plentifully over most of the island. The island is remarkable for its great rock-cut caves, with colossal statues of Buddha.

Sal'sify. See *Salsafy.*

Salsilla (sal-sil'a), a name of several amaryllidaceous plants producing edible tubers, and belonging to the genus *Bomarea*, or to the closely-allied genus *Alstrœmeria.* One species (*B.* or *A. edūlis*) is cultivated in the West Indies, its roots being eaten like the potato; it is diaphoretic and diuretic. Other species, such as *B. Salsilla*, are natives of the Peruvian Andes, and are pretty twining plants with showy flowers.

Salsola (sal'sō-la), saltwort, a genus of plants which belongs to the nat. order Chenopodiaceæ, and comprises about forty species of mostly hardy shrubs, or sub-shrubs, of variable habit, mainly natives of saline districts in temperate regions. The ashes of *S. Kali*, the prickly saltwort, a British plant, and of *S. Soda*, a south European and North American species, were formerly much used in the production of an impure carbonate of soda, known as *barilla.*

Salt (salt), in chemistry, a compound usually obtained from the action of an acid upon a base. It is impossible to state in very precise terms what is the idea attached to the word salt, as at present used in chemical science. It may perhaps be most correctly defined by saying that it implies the capability of readily undergoing *double decomposition.* In its most restricted signification the word salt suggests a substance which, if soluble in water, can produce *rapid* double decompositions with other soluble substances, or if insoluble, can be produced as a precipitate, as the result of a rapid double decomposition taking place between soluble substances. This is certainly the idea suggested by the application of the word salt to nitrate of potassium, chloride of sodium, etc. The term salt is also sometimes applied to substances which, like chloride of ethyl, give rise to *slow* processes of double decomposition with aqueous solutions of the salts specially so-called. The name is, however, most commonly and most appropriately applied to those bodies of which reaction by double decomposition is the most characteristic property, and which exhibit such reactions under the most familiar conditions.

Salt (salt), COMMON (chloride of sodium, NaCl), a substance in common use as a seasoner and preserver of food from the earliest ages. It exists in immense quantities dissolved in sea-water, and also in the waters of salt springs, and in solid deposits, sometimes on the surface, sometimes at greater or less depths, in almost every geological series. Rock-salt, that is salt in the crystalline or solid form, is found in abundance in nearly every region of the earth. The basin of the Indus and other parts of India possess extensive salt plains. In China deep salt-wells abound. The Sahara and Central and Southern Africa afford inexhaustible supplies. South America, Europe, the West Indies, and the United States also have large natural supplies. Salt manufactured from sea-water is produced extensively along the Mediterranean and Atlantic seaboards. It is chiefly made by natural drying in shallow reservoirs, but also by boiling.

Sun-dried salt is the purest. Salt from sea-water is usually known as *bay-salt*. Most salt, however, is produced from rock-salt or from brine springs, the latter being due to the melting of rock-salt by water. The salt-mines of Wielicza in Galicia were worked in the twelfth century, and are the most celebrated in the world. The salt deposits of the United States extend widely through the geological strata. The most important salt-yielding State is Michigan, whose deposits are of remarkable richness. The wells, which are in the vicinity of Saginaw Bay, seem inexhaustible in supply. Some are over 1900 feet in depth. The wells at Syracuse, New York, yield largely. In the valley of the Mississippi salt springs and wells are numerous. In Louisiana, on an island near New Iberia, is an immense deposit of rock salt of unusual purity; the area of the mass is 144 acres, and the quantity of salt it contains is estimated at 28,000,000 tons. On Virgin River, Nevada, there is a bed of rock salt, extending as a bluff along the river, for over twenty-five miles; more than 60 per cent. of the cliff is salt of great purity. California has abundant salt springs and saline marshes. Salt is used largely as a condiment and an antiseptic, as a glaze for coarse pottery, as a mordant, for giving hardness to soaps, for improving the clearness of glass; it is the source of soda and of chlorine, and is thus of immense industrial importance.

Salt, Sir Titus, born at Morley in Yorkshire in 1803; died in 1876. He commenced business as a woolen manufacturer in Bradford in 1824, and rapidly acquired a fortune. In 1853 he began the erection of a model manufacturing village on the banks of the Aire (Saltaire; which see). He represented Bradford as a Liberal 1859–61, and was made a baronet in 1869. He was the head of the firm of Titus Salt, Sons, & Co., and was liberal in contributions to many public institutions.

Salta (säl'ta), a province and town of the Argentine Republic. The province, which is the frontier one to the north, consists of ramifications of the Andes, fertile valleys, and wooded or pasture lands; area, about 60,000 square miles. The chief rivers are the Bermejo and Salado. Pop. 136,059.—The town is about 800 miles northwest of Buenos Ayres, at the bottom of a marshy valley, liable to occasional inundations, has a neat appearance, possesses a cathedral and several churches, but from its situation is unhealthy. The climate is hot with a wet and dry season. Pop. 18,000.

Saltaire (sąl-tār'), a town, West Riding, Yorkshire, on the river Aire, 4 miles N. W. of Bradford. It is a model town, with well-planned streets, and is named after its founder, Sir Titus Salt, who planted here his vast factories for the manufacture of alpaca, and built dwellings for his employees. Pop. about 5000.

Saltcoats (sąlt'kōts), a town of Scotland, in Ayrshire, on the Firth of Clyde, 29 miles southwest of Glasgow. The inhabitants are mainly employed in coal-mines, shipbuilding-yards, iron foundries and dynamite works. Pop. (1911) 8585; (1921) 13,477.

Saltillo (sål-til'yō), a town of Mexico, department of Coahuila, on the Tigre, a well-built town, with extensive manufactures of woolen blankets and serapes or ponchos. Pop. 23,996.

Saltire.

Saltire (sal'tēr), in heraldry, an ordinary in the form of a St. Andrew's cross, formed by two bends, dexter and sinister, crossing each other. See *Heraldry*.

Salt Lake, Great. See *Great Salt Lake*.

Salt Lake City, the capital of the State of Utah, 2 miles from the Jordan River, and 11 miles from Great Salt Lake. It stands at the base of Wasatch Mountains, 4250 feet above sea-level. The city is laid out in blocks 660 feet square with streets 132 feet wide. Temple Block, the 'sacred square' of the Mormons, covering ten acres, is the center of the city. Here is the great Temple with its six spires; the Tabernacle with its wonderful pipe organ, a huge oval auditorium, seating 8000 people, and the Assembly Hall, with seats for 3000. Other notable buildings are the University of Utah, University of Latter-Day Saints, Co-operative Mercantile Institution, etc. The city is the metropolis of the Mormons, and was first settled in 1847. Fort Douglas, a United States government military post, adjoins the city on the east. It is a great industrial and distributing center. Pop. (1900) 53,531; (1910) 92,777; (1920) 118,110.

Salt of Sorrel. See *Oxalic Acid*.

Salton Sea or Sink, the bed of an ancient marine lake in Imperial and Riverside Cos., California, 260 ft. below sea-level, which was converted 1905-06 into a fresh-water lake covering 600 sq. m., through the

breaking of the canal banks from the Colorado River, built to irrigate the Imperial Valley. It overflows a considerable cultivated district and the roadbed of the Southern Pacific Railroad. The break in the river bank was repaired with great difficulty, leaving the reduction of the lake to evaporation.

Saltpeter. See *Niter.*

Salt Range, a hill system of India, in Jehlam, Shahpur, and Bunno districts of the Punjab, deriving its name from its extensive deposits of rock-salt; greatest height 5010 feet.

Salts, SMELLING, a preparation of carbonate of ammonia with some agreeable scent, as lavender or bergamot, used by ladies as a stimulant and restorative in fits of faintness.

Saltus, EDGAR, novelist, was born at New York in 1858, and graduated at Columbia College in 1880. He published two works of humor, the *Philosophy of Disenchantment* and *The Anatomy of Negation.* His novels include *The Pace that Kills, Madame Sapphira, When Dreams Come True, Purple and Fine Women,* etc. Died 1921.

Saltwort. See *Salsola.*

Salute (sa-lūt'), ARMY and NAVY, the firing off of guns in honor of any person of rank or distinction. According to the rank of the person to be saluted, the number of guns fired varies. A general salute is given by a body of troops on parade to a general officer by presenting arms.

Saluzzo (sȧ-lut'zō), a town of Italy, Piedmont, province of Cuneo, 30 miles south by west of Turin. It consists of an upper and a lower town, is the see of a bishop, and has a large, interesting, and handsome cathedral begun in 1480. Pop. 10,306.

Salvador (säl-va-dōr'), a republic in Central America, lies along the coast of the Pacific and is bounded by Honduras on the north and east, and by Guatemala on the northwest; area, 7212 square miles. A range of volcanic peaks, varying in height from 4000 to 9000 feet, runs through the center of the country, dividing an interior valley from the lowlands on the coast. The largest river is the Lempe, which is only navigable in parts. The soil is remarkably fertile. The most important crop for a long time was indigo, which was of excellent quality; but it is now little grown. Maize, sugar, coffee, tobacco, rubber, and some cotton are grown and thrive well. Cattle-breeding is carried on, but not extensively. The mineral deposits include gold, silver, copper, iron, and mercury. The chief exports are coffee, indigo, silver, raw sugar, balsam of Peru, leather, etc. The population consists of a small number of whites (of Spanish descent), Spanish-speaking Indians, and mixed races. The dominant religion is Roman Catholicism. The executive is in the hands of a President and 4 ministers. There is a congress of 42 Deputies, elected by universal suffrage. Pop. (1919 est.) 1,298,621. Salvador remained under Spanish rule until 1821, when it asserted its independence, and joined the Mexican Confederation. In 1823, however, it seceded from the Confederation, and subsequently formed part of the Republic of Central America. In 1853 it became an independent republic. Its progress has been much hindered by revolutions and counter-revolutions.

Salvadora (sal-va-dō'ra), a genus of plants, type of a nat. order (Salvadoraceæ) of monopetalous dicotyledons, allied to Oleaceæ and Jasminaceæ. They have stems with slightly swollen joints, opposite entire leaves, and loose branching panicles of small flowers. *S. persica* is supposed to be the mustard-tree of Scripture, which has very small seeds, and grows into a tree. Its fruit is succulent, and tastes like garden cress. The bark of the root is acrid.

Salvage (sal'vij), a recompense allowed by law to anyone, by whose voluntary exertions ships or goods have been saved from the dangers of the sea, fire, pirates, or enemies.

Salvarsan, the name given by Professors Ehrlich and Hata to a claimed specific for syphilis, discovered in 1907, and also known as '606,' because it was the 606th arsenical compound tried by the experimenters. Its chemical title is Amido-arseno-benzol, and it belongs to the same series of arsenical compounds as atoxol, advocated as a remedy for sleeping sickness.

Salvation Army (sal-vā'shun), a religious organization originated in East London by William Booth, its leader and general, in 1865. The society was developed in its present form and received its name in 1876. With the name *army* came military phraseology. Prayer was called *knee-drill;* the leader a *general;* evangelists, *officers* (of different grades); and candidates, *cadets.* A semi-military attire was assumed, barracks were built, and the army marches out with banners displayed and bands of music. The object is to attract persons who would not enter church and for this cause pub-

lic-houses, prisons, etc., are visited, and open-air meetings are held. The weekly journal of the army is the *War Cry*. The army now carries on operations in most countries of the world, and has made great progress in the United States. During the European war it performed valiant service in keeping up the morale of the men. No work of any organization was more popular with the soldiers in France.

Sal Volatile (sal vol'a-til), carbonate of ammonia. The name is also applied to a spirituous solution of carbonate of ammonia flavored with aromatics.

Salwin (säl'wēn), SALWEEN', or SALWEN, a river of Burmah, with a general north and south course, parallel to the Irrawady, rising in Southwestern China, and falling into the Indian Ocean (Gulf of Martaban), the towns of Martaban, Moulmein, and Amherst being at or near its mouth. The river course is interrupted by rocks and rapids, but vessels of the largest size can reach Moulmein. Vast quantities of teak are annually floated down the Salwin and shipped at Moulmein for export. The area of the Salwin basin is 62,700 square miles; the river is 800 miles in length, and from 1 to 4 miles in breadth.

Salve Regina (sal'vē re-jī'na), a Roman Catholic hymn to the Virgin, named from its first words. It dates from the eleventh century, but first found a place in the breviary of Cardinal Quignon in 1536, and thence in that of Pope Pius V in 1568.

Salvini (sal-vē'nē), TOMMASO an Italian tragedian, born in Milan, in 1830; died in 1916. His father and mother were both actors. In 1849 he fought with distinction in the revolutionary war. He scored successes in Brussels and Madrid and visited the United States in 1874, England in 1875, but after other visits to the United States and Great Britain he retired from the stage to enjoy a life of leisure in his villa near Florence. His most striking parts were *Othello*, *Hamlet*, *Macbeth*, and *Lear*. His son, ALESSANDRO, adopted his career and inherited much of his talent.

Salzbrunn (sälts'brun), a town of Prussian Silesia, 43 miles by railway from Breslau, 1270 feet above the sea, with saline mineral springs, which cause a considerable influx of visitors from May to October. The waters are cold, are used both for bathing and drinking, and are recommended for gravel and gout. It manufactures glass and porcelain. Pop. 5141.

Salzburg (sälts'burh), a city of Austria, capital of the Duchy (or province) of Salzburg, is most picturesquely situated on both banks of the rapid Salza, which is here hemmed in between two isolated hills, 63 miles southeast of Munich. It is partly walled, and has several handsome squares and streets, ornamental grounds, park, and river promenades. The principal edifices are the cathedral (1614–28) built in imitation of St. Peter's, Rome, several other churches, the archbishop's palace (now belonging to the town), imperial palace, exchange, museum, and several benevolent institutions. It was the birthplace of Mozart, and there is a bronze statue of the composer by Schwanthaler. There is a theological college, and other high-class educational institutions, extensive libraries, etc. The manufactures are varied, but not individually of importance. The environs of Salzburg furnish charming scenery. The town was the see of a bishop in the seventh century, which in 798 was raised to an archbishopric. The bishops of Salzburg were princes of the German Empire, and held the position of sovereigns over the archbishopric till it was secularized in 1802. Pop. 36,206.—The Duchy or crown-land of Salzburg, area 2767 square miles, is in the region of the Alps, and is a rugged mountainous country, intersected by numerous valleys, chiefly pastoral, but too broken for much cultivation. Wood is abundant, and the minerals, which are very valuable, include gold, silver, lead, copper, cobalt, iron, salt, and marble. Pop. 192,763.

Salzkammergut (zälts'käm-ėr-göt), a district in Upper Austria, between Salzburg and Styria, with an area of 340 square miles. It is alpine throughout, is celebrated for its scenery, and contains the beautiful lakes of Traun and Hallstädt. It has little arable land, but rears great numbers of cattle; is well wooded, and is rich in minerals, including marble, coal, and more especially salt. The chief towns are Ischl and Laufen. Pop. about 20,000.

Salzwedel (zälts'vā-dl), a town of Prussia, in the province of Saxony, 54 miles N. N. W. of Magdeburg, on both sides of the Jeetze; with various manufactures. Pop. (1905) 11,122.

Samar (sä-mär'), one of the Philippine Isles, separated by channels from Luzon on the north, and Leyte on the south. Area, 5000 square miles. The island is densely wooded and the soil fertile. The chief products are rice, cocoa, palm-oil, hemp, and timber. Pop 222,690.

Samara (sam'a-ra), a name given in botany to an indehiscent fruit, producing a wing from its back or end; such as the fruit of the maple, ash, etc.

Samara of the Common Maple.

Sama'ra, a town of Russia, capital of the government of same name, 550 miles E. S. E. of Moscow, at the confluence of the Samara with the Volga. It has manufactures of leather and soap, and is now one of the most important commercial centers on the Volga, carrying on a large trade in corn, meal, salt, linen, wool, fish, and caviare. Three markets are held annually. Pop. about 150,000.—The government lies on the left bank of the Volga, and has an area of 58,302 square miles. A great part is flat and fertile, but is at present little cultivated. There is little wood. Wheat and other kinds of grain are the chief products. There are a considerable number of Swiss and German colonists here, also Nogai Tartars, Bashkirs, and Kirghis. Pop. 2,763,478.

Samarang (sä-ma-räng'), a town of Java, on the north coast of the island, near the mouth of the Samarang river. Next to Batavia and Surabaya it ranks as the most important commercial port of Java. Its harbor is not good, and large ships have to anchor at some distance from the shore. Pop. 96,660. It is the capital of a residency of the same name.

Samaria (sa-mā'ri-a), or SEBASTE (modern *Sebustieh*), an ancient town of Palestine, formerly the capital of the Kingdom of Israel, finely situated on a hill surrounded by higher hills, 36 miles N. N. W. of Jerusalem. Samaria was built by Omri, king of Israel, about B.C. 925, and was the metropolis of the ten tribes till they were carried away into captivity about B.C. 720. After its destruction by John Hyrcanus it was rebuilt, and given by Augustus to Herod, who gave it the name of Sebaste. There is now an insignificant village here and some striking ruins.

Samaritan Pentateuch, an ancient version of the five books of Moses, which has been preserved by the Samaritans as the canonical Scriptures have by the Jews.

Samaritans (sa-mar'i-tanz), a mixed people, who inhabited the region between Judæa and Galilee, and who formed a sect among the Jews. They consisted partly of the tribes of Ephraim and Manasseh left in Samaria by the King of Assyria when he had carried their brethren away captive, and partly of Assyrian colonists. On the return of the Jews from captivity they declined to mix with the Samaritans, though united with them in religion. The latter attempted to prevent the Jews from building the temple at Jerusalem, and, failing in this, they built a temple on Mount Gerizim exclusively for their own worship. A few of the race still exist scattered in Egypt, at Damascus, and at Gaza. They adhere strictly to the Mosaic law, but are regarded by the Jews as heretics, as they accept only the Pentateuch, of which they have a special version of their own. They believe in the existence of angels, in a resurrection and future retribution, and expect the coming of a Messiah, in whom they look only for a prophet. In the synagogue the Aramaic Samaritan dialect is used, but they generally speak Arabic. They avoid any connections with other sects, and marry only among their own nation.

Samarkand (såm-år-kånt'), a city of Asiatic Russia, on the Zerafshan river, 130 miles E. of Bokhara, situated in a fertile plain, capital of a territory of the same name. It is surrounded by a double wall, and contains numerous gardens. The tomb of Tamerlane is an octagonal building paved with white marble. The mosque of Shah Zindeh, outside the city walls, is one of the finest in Central Asia. Caravansaries and bazaars are the other large buildings. It was once the capital of a powerful Asiatic kingdom, and subsequently of Tamerlane's empire. Samarkand was ceded to Russia in 1868, since when extensive irrigation works have been constructed, and the Transcaspian Railway now extends to the city. It is still a center for the caravan trade and has important native industries, comprising gold and silver ware, leather goods, tanneries, dyeing, harness, cottons and silk, wine and pottery. Pop. 89,693. See *Bokhara.*

Sambas (säm-bäs'), a town of Western Borneo, on the river Sambas, not far above its mouth, seat of a Dutch resident. Pop. 10,000.

Sambor (sam'bōr), a town of Austria, in Galicia, on the Dniester. Pop. 17,039.

Sambre (säṇ-br), a river of N. E. France and Belgium, a tributary of the Meuse, which it enters at Namur; length 110 miles, great part of which is useful for navigation.

Sambucus (sam-bū'kus), a genus of trees. See *Elder.*

Sambur Deer (sam'bur; or SAMBOO). See *Rusa*.

Samian Ware (sā'mi-an), a name given to an ancient kind of Greek pottery made of Samian earth, or to a variety of Roman pottery made in imitation of this. The vases are of a bright red or black color, covered with a lustrous siliceous glaze, with separately-molded ornaments attached to them.

Samnites (sam'nīts), an ancient people of Lower Italy, who were of Sabine stock, and consisted of several tribes. They were a brave, frugal, and religious people. Their first war with the Romans resulted in favor of the latter, and secured a Samnite alliance during the Latin war (340–338 B.C.). The second Samnite war (326–304 B.C.) was a fierce contest, in which the Romans were shamefully defeated at the Caudine Forks, but were finally successful. The third Samnite war (298–290 B.C.) saw the overthrow of the Samnites and Gauls at Sentinum. When the Italian allies of Rome revolted against her in 90 B.C. the Samnites once again rose against their oppressors but were completely subdued and almost extirpated by Sulla. The Samnites appear to have been a rude pastoral people. Their form of government was democratic.

Samoa (sä-mō'a), or NAVIGATOR ISLES, a group of volcanic islands in the South Pacific, N. E. of the Fiji group, made up of three large islands, Upola, Savaii, and Tutuila; and a number of smaller ones; total area about 1700 sq. miles, with a population of nearly 39,000. The most important island of the group is Upola, with an area of 340 sq. miles, diversified by mountains and fertile plains; pop. about 17,000. Apia, the seat of government, is a town of 1500 inhabitants situated on a bay on the N. W. side of Upola. Savaii, the largest of the group, has an area of 659 sq. miles, and is extremely mountainous (greatest height 5350 feet), the interior being hardly known. Tutuila has an area of 54 sq. miles. The Samoans are of the Polynesian race, and vary in color from a dark brown to a light copper, occasionally to a shade of olive. They are of fine physique and of a gentle disposition, and are now all Christians. Their language contains thirteen letters, and is soft and liquid. The leading industries are fishing, collecting copra, the cultivation of fruit, cotton, and *taro*, and the manufacture of *tapa*, a native cloth. The cocoanut, breadfruit tree, taro, and banana form the staple food of the people. The former government consisted of a king and vice-king, and a parliament of chiefs called the *malo*. Disturbances broke out in the island in the late nineteenth century through the jealousy of foreign settlers and the intrigues of the Germans among the native leaders, but in 1889 an agreement was made between Germany, Great Britain, and the United States guaranteeing the neutrality of the islands, and placing each power on an equal footing as regards trade, etc. In January, 1899, further trouble arose. In November, 1899, an agreement for the partition of Samoa between the United States and Germany was made between the three powers, the claim of Great Britain being given up for concessions elsewhere. The United States obtained Tutuila, and some smaller islands, with the fine harbor of Pago Pago.

Samos (sā'mos), now SAMO, an island in the Grecian Archipelago near the coast of Asia Minor, 45 miles southwest of Smyrna, forming a principality tributary to Turkey; area, 180 square miles. It has a mountainous surface, partly covered with pine forests; several fertile and well-watered valleys; produces corn, fruit, and excellent wine; and has several valuable minerals, including argentiferous lead, iron, and marble. The principal town is Vathe, with a good harbor on the northeast side of the island. The principal exports are raisins, skins, wine, and oil; imports, grain, colonial produce, and woven fabrics. Samos was inhabited in antiquity by Ionian Greeks, and had an important position among the Greek communities as early as the seventh century B.C. In the latter half of the sixth century it was in a specially flourishing condition under Polycrates, and subsequently was under the domination of Athens. Pop. 49,733, mostly Greeks.

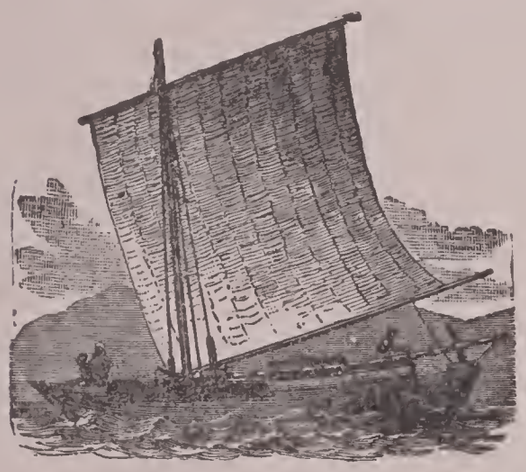
Samothrace (sam'ō-thras), or SAMOTHRAKI, an island in the N. of the Ægean Sea, belonging to Turkey, about 14 miles long by 8 miles broad. It has a very mountainous surface, one of its summits exceeding 5000 feet. Its chief products are corn and oil. The island is of interest as being in antiquity the chief seat of the worship of the Cabiri (see *Cabiri*), and celebrated for its religious mysteries. It is interesting also as being visited by St. Paul in the course of his second missionary journey (Acts xvi, 11). Recent archæological researches have produced valuable results.

Samovar (sam'u-vär), a Russian tea apparatus, the water in which is boiled by means of hot coals

contained in an iron tube, and then poured over the tea.

Samoyedes (sam'o-yēdz), or SAMOIEDES, a people of Ural-Altaic stock, inhabiting the shores of the Arctic Ocean, both in Europe and Asia, from the Yenisei to the White Sea. They consist of two main groups, a southern resembling the Tartars, and a northern and more degraded group. They are nomadic, and live chiefly by fishing, hunting and keeping reindeer. They are of small stature, have a flat, round, and broad face, thick lips, wide nose, little beard, black hair, in small quantity. Their religion is fetishism, though they have an idea of a great divinity; they are extremely superstitious, and generally peaceable. The reindeer supplies them with food, clothing, tents, utensils, etc. They number about 25,000.

Sampan (sam'pan), a boat of various build used on the Chinese rivers, at Singapore, and elsewhere, for the conveyance of merchandise, and also



Sampan, Canton River.

frequently for habitation. They are swift sailers both with oar and sail.

Samphire (sam'fīr; *Crithmum maritimum*), an umbelliferous plant, very succulent, pale green, with bitriternate leaves and lanceolate fleshy leaflets. It grows wild along the seacoast of Europe, and where it abounds it is used by the inhabitants as a pickle, as an ingredient in salads, or as a potherb.

Sampson (samp'sun), WILLIAM THOMAS, naval officer, was born at Palmyra, New York, Feb. 9, 1840, and was graduated from Annapolis in 1861. He served in the Civil war, and gradually rose in rank, being promoted from captain to commodore and rear-admiral during the Spanish war of 1898. He commanded the fleet blockading Santiago, Cuba, during this war, but was absent on the flagship *New York* during the fight with and destruction of the Spanish fleet, in its attempt to escape from Santiago harbor. This circumstance led to a controversy between him and Commodore Schley that excited much attention. He died May 6, 1902.

Samsö (sâm'seu), a small island belonging to Denmark, situated in the Kattegat, between Seeland and Jutland. Pop. 6939.

Samson (sam'sun; Hebrew, *Shimshon*, of uncertain import), an Israelite of the tribe of Dan, the son of Manoah, a popular hero, and an enemy of the Philistines. He is classed among the judges of Israel and the date of his career is estimated at 1116–1096 B.C. He was celebrated for his enormous strength and the story of his exploits and dramatic death are of much interest.

Samsoon (sâm-sön'), or SAMSUM', a seaport of Asiatic Turkey, in the pashalic of Sivas, on a bay of the same name in the Black Sea, 166 miles W. N. W. of Trebizond. It is a steamship station, and carries on a large trade in copper, timber, tobacco, and agricultural produce. Pop. about 13,000.

Samuel (sam'ū-el; Hebrew, *Shemuel*, 'asked from,' or 'heard of God'), the first of the order of prophets and the last of the judges of Israel. He was the son of Elkanah of Ramathaimzophim, belonging to the tribe of Levi, and was consecrated by Hannah, his mother, to the service of Jehovah. He was educated in the house of the chief priest Eli at Shiloh, and had the disasters revealed to him that should befall the house of Eli. He assumed the judgeship of Israel about twenty years after the death of Eli, and headed a successful expedition against the Philistines. He mentions his own name in the list of *warlike* chiefs by whom the Lord sent deliverance to his people, and it is recorded that he judged Israel as civil ruler all his life, going a yearly circuit from Ramah, where was his home, to Bethel, Gilgal, and Mizpeh. His administration was distinguished by the restoration of the neglected worship of Jehovah. He also gave a new vigor to the theocratical institutions of Moses by the establishment of schools of the prophets. In his old age Samuel anointed Saul as king, and when Saul failed in his duties Samuel anointed a new king, David. He did not live to see the contest between David and Saul decided.

Samuel, BOOKS OF, in the Old Testament, are two in number in the modern editions of the Hebrew text. In Hebrew MSS. the work is one, the

division into two books being first introduced by Bomberg, in 1518, at Venice. The contents of the books present us with a more or less consecutive narrative of events relating to the Israelites, from the priesthood of Eli to the death of David. The principal periods embraced in the record are: — the restoration of the theocracy under Samuel (book i, chap. i.–xii. B.C. 1171–1095); the history of Saul's reign, ending with his death (book i, chaps. xiii.–xxxi, B.C. 1095–55); and the history of David's reign (book ii, B.C. 1055–15). As regards the authorship of these books it is evident they could not have been written by Samuel, since his death is recorded in book i, chap. xxv.

Sana (sä-nä′), a town in Southwestern Arabia, capital of Yemen, 170 miles N. N. E. of Mocha, situated in a valley 4000 feet above the sea. The streets are wide, and the town is encircled by a wall about 5 miles in circuit. There are many handsome houses, numerous fountains, two large palaces, many mosques, some of them with tall minarets, baths, caravansaries, and an aqueduct. The chief manufactures are gold and silver products, silks and cottons. Pop. 25,000.

San Angelo, a city, county seat of Tom Green Co., Texas, on a branch of the Concho River, 235 miles S. W. of Fort Worth, in a cattle and sheep district. Pop. (1920) 9995.

San Antonio, county seat of Bexar Co., Texas, the largest city in the State. It is a city of historic interest, possessing a wonderful winter climate; has many fine, modern buildings, the second largest army post in the United States. The Alamo, the cradle of Texas liberty, and four other missions are located here, ancient survivals of the days when the Franciscan monks lived here. San Antonio is the distributing center for all of Southwest Texas, and a large portion of Mexico; is a shipping point for livestock, cotton, wool, grain and hides; has large flour mills, iron works, candy and food products factories; an excellent artesian water supply; commission form of government. Pop. (1900) 53,321; (1910) 96,614; (1920) 161,379.

Sanatorium (san-a-tō′ri-um; a modern Latinism formed from *sanare*, to cure), a place to which people resort for the sake of their health, the term being applied to military or civil stations on the mountains or table-lands of tropical countries, with climates suited to the health of Americans or Europeans, and to health resorts in many parts of the United States.

San Benito (san be-nē′to), a city of Cameron Co., Texas, 20 miles N. of Brownsville. It has cotton gins, sugar factories, etc. Pop. 5070.

Sanbenito, a garment, painted with flames and figures, worn by victims of the Inquisition.

San Bernardino (ber-när-dē′nō), a city, county seat of San Bernardino Co., California, in a noted fruit-growing valley, 60 miles E. of Los Angeles. It is the center of the orange belt, has packing plants, box factories, foundries, and the shops of the Santa Fé R. R. In vicinity are many fine roads, notably the '101-mile Crest' road, 7000 feet high. Pop. (1920) 18,721.

San Cataldo (ka-täl′dō), a town of Sicily, prov. Caltanissetta, with rich sulphur mines in vicinity. Pop. 17,941.

Sanchuniathon (san-kü′ni-a-thon), or SANCHONIATHON, a Phœnician historian and philosopher, who is supposed to have lived about 1250 B.C. Only fragments of his works remain, quoted by Eusebius from a translation into Greek by Philo of Byblos. Some modern critics have said that the fragments were forgeries, and it is now doubted by many whether he ever existed.

San Cristobal (krēs-tō′val), a town of Mexico, capital of the state of Chiapas, 450 miles E. S. E. of the city of Mexico. Manufactures earthenware and coarse textiles, but the chief occupation is cattle rasing. Pop. about 20,000.

Sancroft (sang′kroft), WILLIAM, an English prelate, born in 1616. He was educated at the University of Cambridge, and obtained a fellowship in 1642, but was rejected because he refused to sign the 'engagement' to support the Covenant and the Presbyterian party. After the Restoration he became successively dean of York and St. Paul's, in 1668 archdeacon, and in 1678 archbishop of Canterbury. He was committed to the Tower in 1687 with six other bishops for refusing to read the Declaration of Indulgence, but they were all acquitted. On the Revolution settlement he became a non-juror, and thereby forfeited his archbishopric. He was succeeded by Tillotson, and lived secluded till his death in 1693. Sancroft published some sermons, *Modern Politics*, and one or two other works of little permanent value.

Sanctification (sangk-ti-fi-kā′shun), the term applied in Scripture, as well as in theology, to denote the process by which the effaced im-

age of God in man is restored, and the sinner becomes a saint. It is based upon the holiness of God, who communicates his purity to his people by means of the Holy Spirit. Sanctification is distinguished from justification in this, that while justification changes the state of the sinner in law before God as a judge, sanctification changes the heart before him as a father. Justification precedes sanctification; the one removing the guilt, the other the power of sin. The former is an act done at once, the latter is a gradual process.

Sancti Spiritus (sangk'tē spē'retös), a city of Santa Clara province, Cuba, about 50 miles S. E. of Santa Clara, on the Yayabo River. The city has an asylum for girls, hospitals, a college, etc. Pop. 17,440.

Sanctuary (sangk'tū-a-ri), RIGHT OF, is the privilege attaching to certain places in virtue of which criminals taking refuge in them are protected from the ordinary operation of the law. By the Levitical law there were six cities of refuge in Palestine for the involuntary manslayer, and a somewhat similar provision is traceable among heathen nations. From the time of Constantine downwards certain churches were set apart in many countries to be an asylum for fugitives from the hands of justice. During the middle ages the custom of sanctuary was much abused, the privilege being often extended to wilful malefactors. In England, particularly down to the time of the Reformation, any person who had taken refuge in a sanctuary was secured from punishment — except when charged with treason or sacrilege — if within the space of forty days he gave signs of repentance, and subjected himself to banishment. Sanctuaries were finally abolished in 1697. In Scotland the Abbey and Palace of Holyrood, with their precincts, including Arthur Seat and the Queen's Park, have the privilege of giving sanctuary to civil debtors, but since the abolition of imprisonment for debt the importance of this protection has ceased.

Sand, fine particles of stone, particularly of siliceous stone in a loose state, but not reduced to powder or dust; a collection of siliceous granules not coherent when wet. Most of the sands which we observe are the ruins of disintegrated rocks, and differ in color according to the rocks from which they were derived. Sands occur very abundantly, not only on the sea bottoms, but in many inland locations, formerly sea-bottoms, and very extensively in the great deserts of the world. Valuable metallic ores, as those of gold, platinum, tin, copper, iron, titanium, often occur in the form of sand or mixed with that substance. Pure siliceous sands are very valuable for the manufacture of glass, for making mortar, filters, ameliorating dense clay soils, for making molds in founding, and many other purposes.

Sand, GEORGE. See *Dudevant.*

Sandal (san'dal), a kind of shoe or covering for the feet used among the ancient Jews, Greeks, and Romans. It consisted of a sole fastened to the foot by means of straps crossed over and wound round the ankle. Originally made of wood, vegetable leaves or

Sandal-wood (*Santălum album*).

fibers, or leather, they afterwards became articles of great luxury, being made of gold, silver, and other precious materials, and beautifully ornamented. Certain religious orders of the present day wear sandals.

Sandal-wood (genus *Santălum*, nat. order Santalaceæ), a tree belonging to the East Indies and the Malayan and Polynesian islands, remarkable for its fragrance. Its wood is used as a perfume, and is manufactured into glove-boxes and other light articles. It is largely used as incense in the worship of Brahmans and Buddhists. There are several species which furnish sandal-wood, the common being *S. album.* Some trees or other genera are called false sandal-wood. See also *Adenanthera.*

Sandal-wood Island, OR JEENDANA, a large island in the Indian Archipelago belonging to the Dutch residency of Timor, crossed by the meridian of 120° E.; area, 4966 square miles; with a popula-

tion of about 1,000,000. The coast is bold, and terminates at the southern extremity in a lofty and inaccessible peninsula. The interior is mountainous. Edible birds'-nests, bees'-wax, and sandal-wood are obtained here. The natives are described as treacherous and ferocious.

Sandarach (san'da-rak), a resin which exudes from the bark of the sandarach-tree (which see). It is used as incense, and for making a pale varnish. It is also used as pounce-powder for strewing over paper erasures. Called also *Juniper-resin.*

Sandarach-tree (*Callitris quadrivalvis*), a large coniferous tree with straggling branches, yielding the resin described in preceding article. It is a native of Morocco, Algeria, and Northern Africa generally. The timber is fragrant, hard, and durable, and is largely used in the construction of mosques and other buildings, as well as for cabinet work.

Sanday (san'dā), one of the Orkneys, an island of very irregular shape, generally with a very flat surface and a light sandy soil; greatest length fully 13 miles. There are a number of small lakes. Pop. 2082.—There is another small island of same name in the Inner Hebrides, connected with Canna at low water, 4 miles northwest of Rum. Pop. 62.

Sandbach (sand'bach), a market-town of Cheshire, England, 4½ miles northeast of Crewe. It has a handsome church, a spacious grammar school, and in the marketplace are two antique obelisks. In the neighborhood are saltworks. Pop. 5723.

Sand-blast, a method of engraving and cutting glass and other hard materials by the percussive force of particles of sand driven by a steam or air blast.

Sandbox-tree. See *Hura.*

Sand-crab, or RACING CRAB, a genus (*Ocypŏda*) of crabs, which live in holes in the sand along the sea shores of warm countries. *O. cursor* inhabits the Mediterranean, Red Sea, and Indian Ocean, and is remarkable for the rapidity of its motions.

Sand-eel, a genus of teleostean fishes belonging to the suborder Anacanthini. The body is slender and cylindrical, somewhat resembling that of an eel, and varying from 4 inches to about 1 foot in length, of a beautiful silvery luster, destitute of ventral fins, and the scales hardly perceptible.

Sandemanians (san-de-mā'ni-anz), or GLASSITES, a sect founded by John Glass, a Scotchman, about 1728. He was originally a Presbyterian minister, but was suspended for holding heretical opinions. Among other views, he held that the Church and State should be in no way connected, and that there should be no established church. These doctrines were much developed by his son-in-law, Robert Sandeman (born at Perth, 1723; died in America, 1771), who established the sect in London and America. He maintained that justification by faith meant nothing more than a simple assent to the divine mission of Christ. The Sandemanians still exist as a very small body, and have revived several customs of the primitive church, such as the kiss of charity, the use of the lot, and the weekly love-feasts.

Sander (san'dėr; *Lucioperca sandra*), a species of fishes belonging to the perch family, and found in fresh-water rivers and streams in Germany and the east of Europe generally. It attains an average length of from 3 to 4 feet, and is esteemed as an article of food. It is known under the name of pike-perch.

Sanderling (san'dėr-ling; *Calidris arenaria*), a wading bird averaging from 6 to 8 inches in length, which breeds in the Arctic regions, and in winter migrates southward. It feeds on small marine animals, and chiefly inhabits the sandy tracts of the sea-beach and the estuaries of rivers. The flesh is nutritious and pleasant to the taste.

Sanders-wood. See *Santal-wood.*

Sand-flea. Same as *Sand-hopper.*

Sand-flies (genus *Simulium*), the name of certain flies found in various countries, the bite of which may give rise to painful swellings. They are included in the family Tipulidæ, which also includes the well-known 'daddy long legs,' or crane-flies.

Sand-grouse (*Pterocles*), a genus of rasorial or scratching birds, belonging to the family Pteroclidæ, and differing in several respects from the common grouse (which see), belonging to the family Tetraonidæ. They are natives chiefly of the warm parts of Asia and Africa, and are most abundant in arid sandy plains. The legs are longer than in other grouse, and the tail and wings are pointed. Pallas's sand-grouse differs from these in having feathered tarsi and united toes. It has been made the type of the genus *Syrrhaptes*, and is a native of the sandy plains of Central Asia, where it occurs in vast numbers.

Much interest was excited in 1863, and again in 1888, by vast flocks of these birds invading Europe. They crossed the North Sea, and were found in considerable numbers throughout Britain and the Faroe Isles.

Sand-hopper (*Talitrus locusta*), a species of small insect-like crustaceans of the order Amphipoda, common along most sea shores, where they may be met leaping about the sands in great quantities after the receding tide.

Sandhurst (sand'hurst), a village in England, Berkshire, pleasantly situated on the Blackwater, and famous for its royal military college, originally founded at Great Marlow in 1802, but removed to Sandhurst in 1812. It is now used for giving one year's special training in the theoretical part of the science of war to those cadets who have passed by competition for the army.

Sandhurst, or BENDIGO, a city of Victoria, Australia, 100 miles N. N. W. of Melbourne, in a gold-mining region. It has iron foundries and other industries. There are handsome government buildings, town hall, mechanics' institute (with very large library), etc.

San Diego (sän dē-ā'go), a city, port of entry and county seat of San Diego Co., California, at the extreme S. W. corner of the United States, 15 miles N. of the Mexican border, on San Diego Bay, a fine landlocked harbor which contains an area of 22 sq. miles. The U. S. Army and Navy have large tracts on the bay. At Camp Kearney the 40th Division was trained and went overseas from here in the World war. It has a mild and equable climate. Coronado Beach, across the bay, is a popular resort. San Diego is the first port of call from Panama and has an important foreign commerce, with several ocean steamship lines. It is the home port and operating base for the major portion of the Pacific fleet. There are over 200 manufacturing enterprises; products include canned fish, fruit and vegetables; building material, lumber, onyx and marble products, cement pipe, sash and doors, brick and tile, magnesite products, olives and olive oil, trunks, bags, flour, etc. It has many parks, including Balboa (1400 acres) and the Exposition Grounds, where the Panama-California Exposition was held 1915-17. Pop. (1910) 39,578; (1920) 74,683.

Sand-martin, or BANK-MARTIN (*Hirundo* or *Cotile riparia*), a bird included in the family of swallows, a summer visitant to Britain, where it is common in most localities. It is the smallest European member of its family, and is so named from its habits of nest-building in holes dug in the high banks of rivers, in the sides of sand or gravel pits, and in similar situations. The color of the sand-martin is a soft brown on the head and upper parts, and white below, with a dark brown band on the chest.

Sand-mole, a South African rodent, of the size of a rabbit, with light grayish-brown fur. The eyes are very small; external ears wanting; tail short.

San Domingo. See *Hayti, Dominican Republic.*

San Domingo (sän dō-min'gō; more properly SANTO DOMINGO), the capital city of the Dominican Republic, which includes the eastern part of the island of Hayti. The town is situated at the mouth of the Ozama on the south coast, and is the seat of the government and a bishop's see. It has spacious streets and squares, a cathedral dating from 1540, a university, etc. San Domingo is the oldest European city of the New World, having been founded by Bartholomew Columbus in 1496. Columbus was buried here in 1536, but his remains were removed to Havana in 1794. Pop. about 25,000.

Sand-paper, is made in the same way as emery-paper, with the difference that sand is substituted for emery. See *Emery.*

Sand-pipers, a group of small grallatorial or wading birds, belonging to the family Scolopacidæ or snipes. These birds inhabit the shores of the sea and the estuaries and banks of rivers, and grope in the soft mud for the worms, small molluscs, insects, etc., upon which they feed. They migrate southwards in winter in flocks, and appear to molt twice a year, the summer plumage differing from the winter dress. The voice is shrill and unmusical; and they are able both to run and to fly with rapidity. There are several European species and various species exist in the United States, wintering in the West Indies.

Sand-screw (*Sulcātor arenarius*), a species of Crustacea, nearly allied to the sandhoppers (which see), and so named from the tortuous manner in which it excavates its burrows in the sand.

Sand-star (*Ophiura*), a genus of star-fishes belonging to the order Ophiuroidea. In the sand-stars the arms or rays are mere appendages to the body, and not definite parts, and the

viscera or organs of the body do not extend into the rays, but are confined to the central body-piece or 'disc.' The ambulacral system of vessels is not well developed, and does not subserve locomotion to the same extent as in the Asteroidea.

Sandstones, consist usually of grains of quartz aggregated into a compact rock, which may also contain particles of felspar, minute scales of mica, and an admixture of clay, indicating in many places their immediate derivation from the débris of granitic rocks. Sandstones are in most cases chiefly composed of particles of quartz, united by a cement. The cement is in variable quantity, and may be calcareous or marly, argillaceous or argillo-ferruginous, or even siliceous. The grains of quartz are sometimes scarcely distinguishable by the naked eye, and sometimes are equal in size to a nut or an egg, as in those sandstones called conglomerates, or sometimes pudding-stone or breccia. The texture of some sandstones is very close, while in others it is very loose and porous. Some sandstones have a fissile structure, and have been called sandstone slate. In color sandstone varies from gray to reddish-brown, in some cases uniform, in others variegated. In addition to quartz some sandstones contain grains of felspar, flint and siliceous slate, or plates of mica. Some sandstones are ferruginous, containing an oxide or the carbonate of iron. Sandstones have been formed at different periods and under different circumstances, and are hence associated with different rocks or formations. They are in general distinctly stratified, and the beds horizontally arranged, but sometimes they are much inclined or even vertical. Sandstone in some of its varieties is very useful in the arts, and when it has no tendency to split is known by the name of *freestone*. When sufficiently solid it is employed as a building stone. Some varieties are used as millstones for grinding meal, or for wearing down other materials preparatory to a polish, and some are used for whetstones. For the *New Red Sandstone*, and the *Old Red Sandstone*, see *Geology*.

Sandusky (san-dus'ki), a city of Ohio, capital of Erie Co., on a sandstone ridge on the southern side of Sandusky Bay, Lake Erie, about 61 miles W. of Cleveland. Among the principal buildings are a court-house, Federal building, Soldiers' Home and State fish-hatchery. It has a good harbor, and an extensive trade is done in fish, lumber, limestone, manufactured woodwork, grape products, steelwork castings, fibre boxes, chalk and crayons. It has the commission form of government. Pop. (1910) 19,989; (1920) 22,897.

Sand-wasp, a name of hymenopterous insects of the genus *Ammophila*, belonging to a group which, from their peculiar habits, are termed *Fossores* or diggers. The sand-wasp inhabits sunny banks in sandy situations, running among grass, etc., with great activity, and continually vibrating its antennæ and wings. The female is armed with a sting.

Sandwich (sand'wich), a municipal borough and one of the Cinque Ports of England, in the county of Kent, on the Stour, 4 miles from the sea at Pegwell Bay, 78 miles E. of London by rail. The streets are narrow, and part of the old walls and one of the gates are still standing. It was made a Cinque port by Edward the Confessor, and was the royal naval port until the time of Richard II. It has an ancient guild-hall, and a parish church in the early Norman style. The place has a considerable trade, and carries on brewing, malting, tanning, etc. The harbor, long neglected, has been improved, and now admits vessels drawing 10 feet. Pop. 3040.

Sandwich, the name given to an article of food consisting of a slice of meat, fish, fowl, or other savory food placed between two slices of bread, which may be plain or buttered. The term is said to have arisen from an earl of this name having been in the habit of providing himself with one in his pocket to avoid dining in town.

Sandwich Islands. See *Hawaii*.

Sand-worm, a general name for any of the numerous worms living in the sand of the sea-shore. The fisherman's lobworm is one of the most important of these. Hidden under stones or burrowing deeply in the sand are numerous species of errant Chætopods, while the tubes of *Terebella conchilega*, mostly composed of fragments of shell, are familiar objects in the sands.

Sandy Hook, a low sandy peninsula at the entrance of New York harbor. On the N. point are a fixed light 90 feet high and a government proving ground. See *New York*.

Sandys (san'dis or sandz), EDWIN, Archbishop of York, was born in Lancashire, England, in 1519, and educated at Cambridge University, where he became master of Catherine Hall and subsequently vice-chancellor of the uni-

versity. Being a partisan of Lady Jane Grey he was imprisoned in the Tower; but he was liberated at the end of four months, and crossed to Germany. On the accession of Elizabeth he returned to England, and was made bishop of Worcester in 1559. In 1570 he was made bishop of London, and archbishop of York in 1577. He died in 1588.—His son, SIR EDWIN SANDYS (born 1561; died 1629), was employed by James I on several missions, received the honor of knighthood, was connected with the Second Virginia Company and otherwise with the American colonies, and published *Europæ Speculum, a Survey of the State of Religion in the Western Parts of the World.*—Another son, GEORGE SANDYS (born 1577; died 1644), published a *Relation of Travels in the East*, a metrical translation of Ovid's *Metamorphoses*, metrical paraphrases of the Psalms, Job, Ecclesiastes, Song of Solomon, etc. His poetry is praised by Dryden and Pope.

San Fernando (san fėr-nän'dō), a town on the Isla de Leon, Spain, 7 miles from Cadiz. Salt is the staple trade. Pop. 30,000.

Sanford (san'fėrd), EDWARD TERRY, an American jurist, born at Knoxville, Tenn., July 23, 1865, graduated from University of Tennessee in 1883. Admitted to the bar, he became district judge of the Eastern and Middle districts of Tennessee in 1908; justice of U. S. Supreme Court in 1923.

Sanford (san'fėrd), a city, county seat of Seminole Co., Florida, at the head of navigation on the St. Johns River. It is an important railway center and is in the largest vegetable-producing section in the State—what is known as the flowing artesian-well district. Pop. (1920) 5588.

Sanford, a town of York Co., Maine, 31 miles s. w. of Portland, on Mousman River. It has water power and manufactures of lap robes, blankets, shoes, plush, and other products. Pop. (1920) 10,691.

San Francisco (san fran-sis'kō), the chief city and seaport of California and of the Pacific coast of America, is situated on a peninsula or tongue of land between the Pacific Ocean and the Bay of San Francisco, the entrance to the latter being through the Golden Gate, a waterway about 5 miles long and 1 mile wide. The bay to which it leads is deep and spacious, being 50 miles long and from 3 to 12 miles wide. The city was originally of wood, but this has been largely replaced by brick and stone, there being many large and costly buildings of marble, granite and terra cotta, with steel inner framework. Notable among these are the large and handsome city hall and post office, the Hall of Justice, Custom House, mint, Merchants' Exchanges, and the large Ferry Building, a museum of geological and ethnological collections. The educational institutions include the Hopkins Art Institute, Academy of Sciences, Memorial Museum, Mechanics' Institute, Sutro and Public libraries, School of Mechanical Arts, Cooper Medical College, medical and legal departments of the University of California, etc. Market Street, with a length of about 3½

miles, is the chief commercial thoroughfare. Of the city's parks the largest is Golden Gate Park, with an area of 1050 acres. Originally a tract of barren sand-dunes between the city and the ocean, this has been made a beautiful and attractive pleasure ground. The climate is mild, and, on the whole, healthy, but during the summer months a disagreeable day-wind, coming through the Golden Gate, is apt to blow across the city. Of the diversified industries the largest are those of shipbuilding (including battleship construction), the manufacture of foundry and machine shop products, slaughtering and packing, and fruit canning. The commerce of the city, both with foreign and domestic ports, is very large, especially in shipments of gold, silver, and other minerals, wheat, liquors and lumber, and receipts of sugar, coffee and tea. There are steamship lines

Photo Ewing Galloway

SAN FRANCISCO

Looking across the bay toward Berkeley Mountains

to all principal Pacific ports of America, Asia and the Pacific islands.

The site of San Francisco was first occupied by white settlers in 1776, an Indian mission being founded by Spaniards. Sixty years later the little village of Yerba Buena sprang up, the name of San Francisco being adopted in 1847. The conquest of California from Mexico and the discovery of gold in 1848 led to a rapid influx of inhabitants, there being 20,000 by the end of 1849. The city has since then grown with great rapidity. While the population was greatly reduced during 1906, owing to the devastating fire which followed an earthquake shock, the subsequent years found the city rapidly recovering. Though San Francisco ranks second in population (1920 census) among the cities of the Pacific Coast, its metropolitan area ranks first in the west and high among other densely populated centers of the United States. Motorists are attracted by the fine cement roads in its environs. Pop. (1900) 342,782; (1910) 416,912; (1920) 508,410.

Sangallo (sang-gal'ō), ANTONIO, an Italian architect, born in the environs of Florence in 1485. He succeeded his master Bramante as architect of the church of St. Peter's in Rome, and was much employed under the popes Leo X, Clement VII and Paul III, both in fortifying places and in the construction of public buildings, the grandeur and solidity of which have been much admired. He died in 1546. His two uncles, Antonio and Giuliano Sangallo, were also distinguished architects.

Sangerhausen (zäng'ėr-hou-zn), a town of Prussian Saxony, 33 miles W. N. W. of Merseburg, on the Gonna. The town has two castles, and manufactures of iron-ware, machinery, etc. Pop. (1905) 12,439.

San Gimignano (sän ji-min-yä'no), a city of Siena province, Italy, six miles S. W. of Siena. It is notable for the mediæval aspect of its old walls, its many towers, and Gothic edifices, and is rich in splendid works of art, among them beautiful frescoes and paintings of past centuries. Pop. 9848.

San Giovanni (jo-vän'nē), a town of S. Italy, on the Bay of Naples, a suburb of the city of Naples. Pop. 20,797.

Sangir Islands (sän'gēr), a group of small islands in the Indian Archipelago, inhabited by the Malay race (Christians), and belonging to the Netherlands. Most of them are inhabited and are covered with cocoa-palms. Rice, pisang, and sago are cultivated. The islands are all mountainous and partly volcanic. In an eruption of Aboe, a volcano on Great Sangir, in June, 1892, the greater part of the island was devastated, and nearly 10,000 inhabitants perished. Pop. about 50,000.

Sangster (sangs'ter), CHARLES, a Canadian poet, born at Kingston, Ontario, in 1822; died in 1893. He was for 15 years an editor, and for 18 years a post-office official at Ottawa. He wrote *The St. Lawrence and Saguenay* and *Hesperus and other Poems.*

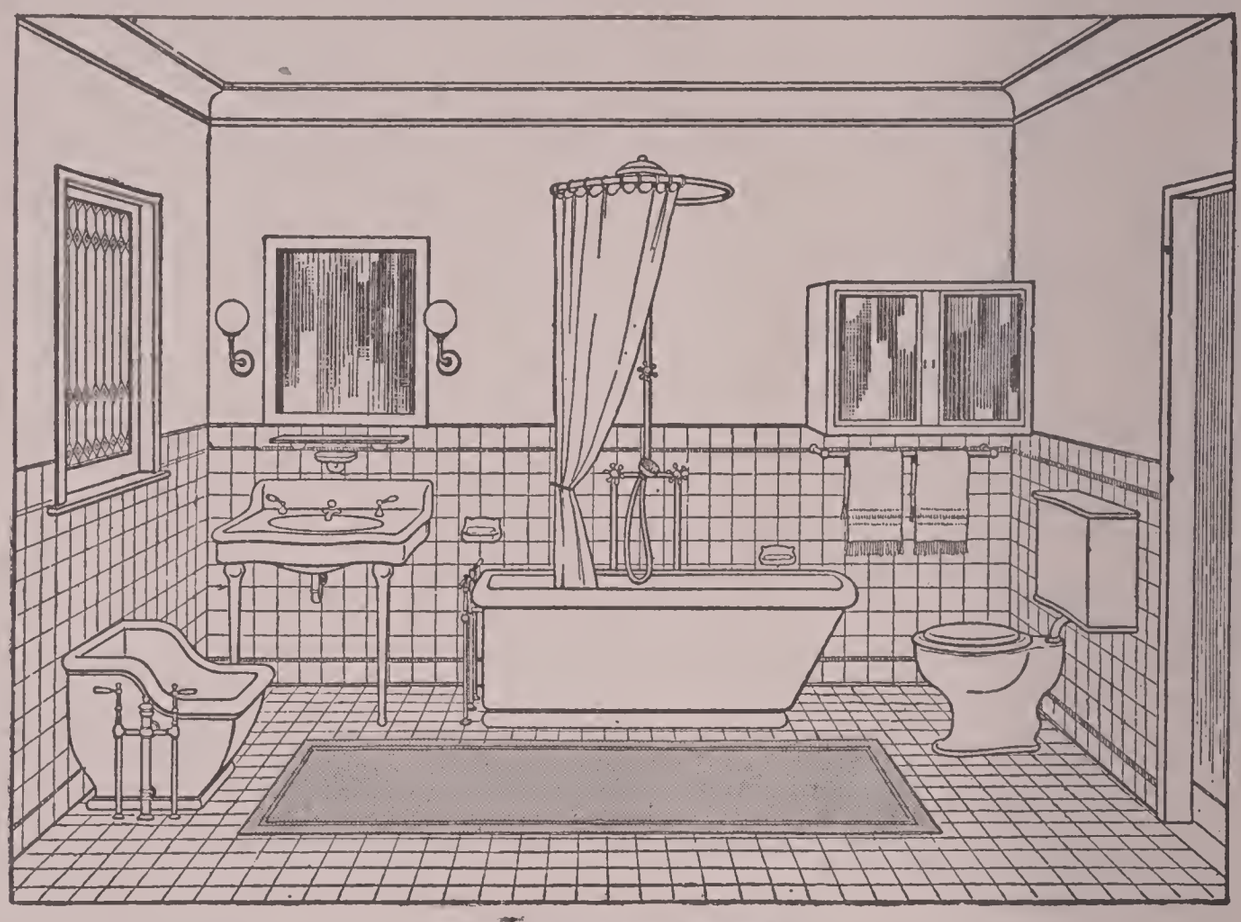
Sangster, MARGARET ELIZABETH MUNSON, American author, born in New Rochelle, N. Y., in 1838; died in 1912. She was educated in Vienna and New York City and in 1858 married George Sangster. She became a favorite contributor to 'home' magazines, and was the author of a number of books and poems.

Sanguinaria. See *Blood-root.*

Sanhedrim (san'he-drim), or SANHEDRIN (corrupted from the Greek *sunedrion*, a council), the supreme judicial tribunal of the Jews, existing in the time of the Maccabees and in New Testament times. According to the Talmud it was founded by Moses when he elected seventy elders to assist him in judging the children of Israel in the wilderness, but this view is now generally rejected. The sanhedrim consisted of seventy members besides the president, who was usually the high-priest. They were chosen from among the priests, elders, heads of families, and scribes or doctors of law, and had power to deal with both secular and spiritual matters. The council became extinct in 425.

Sanitation (san-i-tā'shun), the methods employed to maintain health and ward off disease. The science of sanitation treats more especially of what is required of each individual in his duty to his neighbor, so that by using such means as may ensure his own health he may in a negative way preserve that of his neighbor also. The subject naturally divides itself into four main divisions: — 1. That relating to our dwellings; 2. Food; 3. Clothing; 4. Cleanliness. As regards the first head, our dwellings should be situated so as to ensure a free circulation of air round them, and a thorough system of drainage. The rooms should be large, airy, and well ventilated. There should be an ample supply of pure water, which should be protected from every possible source of contamination. The plumbing should be sanitary, and all pipes and fixtures should

be visible and accessible. Attention should be given to the method of artificial heating and lighting. Details of all these will differ in cities and rural districts. In the country, special care should be taken that the foundations and cellars of the houses are in proper condition; a damp cellar means an unhealthy house. Many of the problems of sanitation are now being attended to by the local health boards, and thus the matter is assuming a *public attitude* rather than remaining a question for individuals to attend to or neglect, as they see fit. Sewer gas, which was formerly considered one of the chief sources of disease, is now known to be comparatively harmless. Over-crowding greatly vitiates the atmosphere and should be avoided. Every portion of a house should be kept scrupulously clean, and after infectious or contagious disease there should be a thorough cleansing and disinfecting of the furniture, bedding, carpets, etc. As regards food and clothing, enough has already been said in the articles *Dietetics* and *Clothing* (q. v.). A few words require to be said, however, on the last division of the subject—that of cleanliness. The neglect of an efficient use of cold water is perhaps one of the most potent and prolific causes of disease. The first duty of every human being is to attend thoroughly to the cleansing of the whole body, and this can only be done by the free application of water. The frequent (preferably daily) use of a cold bath is not only conducive to health, but is a powerful preventive against disease. It is always desirable when we leave a bath that a glow—called the reaction—should be felt all over the body, and this can be assisted by the vigorous use of a rough towel. Bathing in this way is a powerful natural tonic to the skin, nerves, and muscular system. It promotes digestion, regulates the bowels, and is in fact invaluable as a sanitary measure. All underclothing should be changed at least twice a week; and socks and stockings every two days; a daily change would be better. A warm bath (with use of soap) should be taken at least twice a week, and



A Well-Appointed Bathroom

The sanitary arrangements of the home are of the utmost importance, and special thought and attention should be devoted to the bathroom. A daily bath is not only conducive to health but is a powerful preventive against disease.

oftener if convenient. All household furnishings should be kept thoroughly free from dirt. Cleanliness of house, furnishings, body, and clothes, will aid in maintaining health both of body and of mind. An outdoor occupation is to be preferred on the score of health, and exercise of any kind may be taken. In addition, freedom from anxiety, cheerful society, honesty, and the practice of all the virtues are most conducive to the promotion and preservation of health. See also *Germ Theory of Disease, Disinfectant.* The subject of sanitation and hygiene might be extended indefinitely, but attention should be drawn to the modern attitude towards disease. We no longer wait till sickness invades us, but we rather try to keep diseases away by maintaining our bodies in the best possible condition. This is done by proper attention to the skin, teeth, mouth, and other parts of the body; and by seeking proper medical advice on the subject before disease gets a hold on us. Public health, like most other things of value, can be purchased; the price is paid in money, in effort, and in doing as much as possible to promote personal health.

Sanjak (san'jak; Turkish, 'a standard') is the name given to a subdivision of an eyalet or minor province of Turkey, from the circumstance that the governor of such district is entitled to carry in war a standard of one horse-tail.

San Joaquin (*hō-à-kēn'*), a river of California which traverses the valley of the same name from the Tulare Lakes, joins the Sacramento, and falls into Suisun Bay. It has a length of 350 miles.

San Jose (*hō-sā'*), a city, the capital of Santa Clara Co., California, in the valley of Santa Clara, 46 miles by rail s. of San Francisco. The city is embowered in trees and shrubberies, and has a fine park, 6 miles distant, to which leads a beautiful avenue of trees. It contains a city hall, court house, theaters, State normal school, a public library, and several educational institutions. It has extensive fruit-growing and packing interests, machinery and other plants. Santa Clara Valley's fruit, berry and soil products are valued at $50,000,000 annually. Pop. (1910) 28,946; (1920) 39,604.

San Jose, capital of Costa Rica. It stands on a tableland 3900 feet above sea-level, has fine streets and a number of notable buildings, including the National Museum. There is a considerable trade in coffee and other products. Pop. 38,016; with environs, 51,658.

San Jose Scale, the name given a destructive scale insect (*Aspidiotus perniciosus*) of Chinese origin. It has a wide distribution throughout the United States and is a serious enemy of fruit trees in many States. The scale is nearly circular in outline and about the size of the head of a pin. When it is plentiful upon trees it becomes encrusted on the trunk and branches, giving the tree a scurfy appearance. The insect under the protecting scale feeds by sucking the sap of the tree, so a contact insecticide is necessary for its control. A treatment is to spray the trees during the dormant season with concentrated lime-sulphur. The so-called miscible oils (mineral oils which have been so treated that they may be readily mixed with water) are also used successfully.

San Juan, a province of the Argentine Republic; bounded on the w. by the Andes; area, 37,865 sq. miles. It has gold and copper mines. Pop. 127,713.

San Juan, the capital of the province of San Juan, Argentine Republic, situated on San Juan River. It has a number of excellent educational institutions. Pop. 15,000.

San Juan, the capital of Porto Rico, on an island on the north coast, connected with the mainland by a bridge. It is the principal seaport of the island. Morro Castle, built in 1584, is a prominent object. During the Spanish-American war, American naval forces under Admiral Sampson bombarded the town in May, 1898, and later occupied it. At Rio Piedras, 7 miles distant, is the University of Porto Rico (coeducational). The harbor has been improved to have an entrance of 600 yards wide and 30 feet deep. It is a United States naval station. Pop. (1910) 48,716; (1920) 70,707.

San Juan, or VILLA HERMOSA, capital of the State of Tabasco, Mexico, on Grijalva River. It has considerable trade through its port Frontera. Pop. 13,000.

San Juan, full name SAN JUAN DEL NORTE, also called GREYTOWN, a seaport of Nicaragua. Pop. 2500.

San Juan, a river of Central America, which carries the water of Lake Nicaragua to the Caribbean Sea. See *Nicaragua.*

San Juan Boundary Question.

By the Treaty of Washington (June 15, 1846) it was provided that the boundary line between British North America and the United States should be continued to the middle of the channel between Vancouver's Island and the continent, and thence south to the Pacific Ocean. But the island of San Juan

lies in the middle of this channel, and a question immediately arose as to whom the island should belong. It was a subject of long and bitter dispute, but at last the matter was submitted to the arbitration of the Emperor William of Germany without appeal. The emperor's award, dated October 21, 1872, was given unreservedly in favor of the American claim, on the ground that the American view of the treaty of 1846 was the more correct one.

Sankey (san'ki), IRA DAVID, evangelist, born at Edinburgh, Pennsylvania, in 1840. He had fine vocal powers, and for a number of years was associated with Dwight L. Moody, the evangelist, holding the attention of large audiences by singing hymns composed by himself. He died in 1908.

Sānkhya (sång'kya; Sanskrit, numeral or rational), is the name of the chief philosophical system of India. Its doctrines are attributed to the sage Kapila, fabled to have been a son of Brahma and an incarnation of Vishnu. It teaches the eternity of matter and spirit independent of a Supreme Being, and propounds a code of twenty-five principles, by the observance of which eternal happiness or complete exemption from every kind of ill can be obtained. The Sānkhya philosophy is supposed to date from a period anterior to the eighth century B.C.

San Leandro (lē-an'dro), a city of Alameda Co., California, 15 miles from San Francisco. It is a residential place and has lumber mills, etc. Pop. 5703.

San Lucar-de-Barrameda (lö'kär dä bär-rä-mā'thå), a seaport of Spain, at the mouth of the Guadalquivir. There is a considerable trade, especially in wine. Magellan embarked here in 1519 on his first voyage. Pop. 22,645.

San Luis (lö-ēs'), a province of the Argentine Republic. Area, 29,035 square miles. The province is rich in copper and other metals. The leading industry is cattle-rearing. Pop. 124,215. —The chief town is SAN LUIS (Mercedes).

San Luis Obispo, county seat of San Luis Obispo Co., California, 90 miles N.W. of Santa Barbara. It is a great butter-making center and oil-shipping point; has railroad shops, etc. Pop. 5895.

San Luis Potosi (pō-tō-sē'), a city of Mexico, capital of the state of same name, 198 miles N.W. of Mexico, 6350 feet above sea-level; regularly built, with fine streets. It has a handsome cathedral; manufactures of clothing, shoes, hats, etc., railway workshops; and a considerable trade. Pop. 82,946.—The state has an area of 25,316 sq. miles, is generally fertile, and has rich gold and silver mines. Pop. 575,432.

San Marco in Lamis (mär'kō ēn lä'mēs), a town in the province of Foggia, Italy. Pop. 17,309.

San Marino. See *Marino.*

San Martin (sån mår-tēn'), JOSÉ DE, liberator of Chile, was born at Zopeyer, Argentina, in 1778. He joined the Spanish army and fought in the campaigns against France from 1793 till 1811, becoming lieutenant-colonel. Resigning in 1812, he sailed for Buenos Ayres, and joined the patriot army. Here he formed and drilled an army of invasion and in 1817 led a body of 4000 men in a famous march across the Andes, traversing a pass 12,800 feet high. Reaching Chile, he gained a victory at Chacabuco on Feb. 12, following on the 15th with the capture and occupation of Santiago. He was defeated on March 19, 1818, but on April 5 gained a splendid victory at the Malipo, which drove the Spaniards from Chile. He was offered the supreme dictatorship, but declined it, and began preparations for the invasion of Peru. On July 19, 1821, he took Lima from the Spaniards, and carried Callao after a hard fight. On August 3 he was proclaimed supreme protector of Peru. At the same time Bolivar was marching south to Peru, and to prevent rival claims San Martin resigned his office, leaving Bolivar to complete his work. Withdrawing from South American affairs, he went to France and lived there in reduced circumstances until his death, August 17, 1856.

San Mateo (ma-tā'ō), a city of San Mateo Co., California, on San Francisco Bay, 21 miles S. of San Francisco, in a fruit and farming district. It has salt works, furniture factory, planing mill, etc. Pop. (1920) 5979.

San Miguel, a town of Salvador, on a river of the same name, and capital of department of San Miguel. Its trade is largely in indigo. Pop. 29,835.

Sannazaro (sån-åd-zå'rō), JACOPO, an Italian poet who wrote both in Latin and Italian, born at Naples in 1458; died in 1533. He was patronized by King Ferdinand of Naples and his sons Alphonso and Frederick, and

the latter gave him the delightful villa of Mergellina, with a pension of 600 ducats. Sannazaro wrote sonnets and *canzoni* and an idyl (*Arcadia*) in Italian, Latin elegies, eclogues, epigrams, and a longer poem, *De Partu Virginis*, in three books.

San Rafael (san ra-fel′), a residential city, county seat of Marin Co., California, 15 miles N. of San Francisco, on San Pablo Bay. Pop. (1920) 5512.

San Remo (rā′mō), a town in the province of Porto-Maurizio, Italy, on the Gulf of Genoa. It is noted as a climatic health resort, and is situated in a beautiful district. The old town is small and badly built. The new town contains many beautiful villas. Here were held many important conferences of premiers following the European war. Pop. (com.) 23,103.

San Roque (rō′ke), a town of S. Spain, near the peninsula of Gibraltar. Pop. 8569.

San Salvador (säl-va-dōr′), a town in Central America, capital of the state of Salvador, situated near the volcano of same name. The inhabitants are chiefly engaged in agriculture. The town was completely destroyed by earthquake on April 16, 1854, and has suffered severely since. It was founded originally in 1528. Pop. 60,000.

Sansandig (sän-sän-dig′), a town in Segu, Western Soudan, Africa, on the left bank of the Niger. It has an extensive trade and a pop. estimated at 10,000–30,000.

Sans-Culottes (sąn-kų-lot; Fr., 'without breeches'), the name given in derision to the Jacobins or popular party by the aristocratical in the beginning of the French revolution of 1789, and afterwards assumed by the patriots as a title of honor.

San Sebastian (sā-väs-tē-än′), a city and seaport in the northeast of Spain, capital of the province of Guipuzcoa, partly on the side of Mount Orgullo, which projects into the Bay of Biscay, and partly on the isthmus connecting it with the mainland. It was once strongly fortified, its fortifications including the castle of Mota on the summit of Orgullo, 493 feet high. The town consists for the most part of modern houses arranged in spacious streets and squares. The manufactures consist chiefly of cordage, sail-cloth, leather, candles, and soap. The harbor is small, exposed, and difficult of access, and the trade has greatly decayed; but the place is much frequented for sea-bathing. San Sebastian is of considerable antiquity, and having by its early fortification become the key of Spain on the side of France figures much in all the wars between the two countries. In 1813, when held by the French, it was stormed by the British and largely destroyed. Pop. (1910) 47,804.

San Severo (sā-vā′rō), a flourishing town of Southern Italy, in the province of Foggia, 39 miles E. N. E. of Campobasso. It is tolerably well-built, and contains a cathedral. It was destroyed by the French in 1799. Pop. 30,040.

Sansevie′ra. See *Bowstring-hemp.*

Sanskrit Language and Literature (san′skrit). Sanskrit is the name given to the learned and classical language of the Hindus, the language in which most of their vast literature is written, but which has not been a living and spoken language since about the second century before Christ. It is one of the Aryan or Indo-European family of tongues, and may be described as a sister of the Persian, Greek, and Latin, Teutonic, Slavonic, and Celtic tongues. It stands in the same relation to the modern Aryan languages of India as Latin stands to the Romance languages. It is a highly inflected language, having in this respect many resemblances to Greek. To philologists it has proved perhaps the most valuable of tongues, and it was only after it became known to Europeans that philology began to assume the character of a science. Its supreme value is due to the transparency of its structure, and its freedom from the corrupting and disguising effect of phonetic change, and from obliteration of the original meaning of its vocables. The name Sanskrit means carefully constructed or symmetrically formed, and was given to distinguish it from the vernacular dialects, which were called *Prākrit*, that is, common or natural. It is probable that Sanskrit, in its more highly elaborated form, was never spoken by any great body of the people. The alphabet is usually known as the *Nāgarī* or *Deva-Nāgarī*, and in its earliest form dates back several centuries before Christ. It consists of fourteen vowels and diphthongs, and thirty-three consonants, besides one or two other characters. Among the phonetic peculiarities of Sanskrit may be mentioned the absence of *f* and the existence of consonants such as *kh*, *gh*, *th*, *dh*, in which the *h* is distinctly heard after the other sound. When several consonants come together they are fused into one compound character in which the

original components are often hard to distinguish. In Sanskrit roots play a most important part, the processes of declension and conjugation being looked upon as consisting in the appending of certain terminations to root-forms, or roots modified in certain ways to form inflective bases. The system of case-terminations is similar to those in Latin and Greek, but in declensional forms Sanskrit is richer than either of those languages. There are eight cases — nominative, accusative, instrumental, dative, ablative, genitive, locative, and vocative. There are three numbers — singular, dual, and plural — and three genders. The verb in Sanskrit exhibits many striking analogies to the verb in Greek, but it is not so rich in forms. Prepositions are scarcely used in Sanskrit to govern nouns, as in other Aryan languages, but as prefixes to verbs they are of constant occurrence. Syntax holds but an unimportant place in Sanskrit grammar. The excessive use of cumbrous compounds — some of them of extraordinary length and complexity — is a very general feature in Sanskrit, appearing in all styles of composition, but especially in the more artificial.

Sanskrit literature covers a period extending from at least 1500 B.C. to the present time. The great mass of the literature is in meter, even works on science and law having a poetical form. The oldest literary monuments are the *Vedas* — the *Rig*, the *Yajur*, the *Sama*, and the *Atharva Veda*. They are looked upon as the source of all the *shāstras* or sacred writings of the Hindus, which, however, include works upon ethics, science, and philosophy as well as religious works. (See *Veda*.) The *Purānas* form another important department of the religious literature, but are very much later than the Vedas. There are eighteen of them altogether, forming a vast body of literature of varied contents, the subjects treated comprising mythology, legendary, history, cosmogony, with many digressions of a philosophical and didactic nature, though some of them also contain descriptions of places, and pretend to teach medicine, grammar, etc. The oldest law-book is the *Dharma-Shastra*, ascribed to the mythical personage Manu. In the department of epic poetry the chief productions are the epics called the *Rāmāyana* and the *Mahābhārata*. The *Rāmāyana* is believed to be the older of the two, and to have been current in India as early as the fifth century B.C. The *Mahābhārata* is a huge epic of about 220,000 lines, forming rather a cyclopædia of Hindu mythology, legendary history, and philosophy than a poem with a single subject. It is the production of various periods and various authors. (See *Ramayana*, *Mahabharata*.) In the province of lyric poetry we meet with poems of the greatest elegance, tender sentiment, and beautiful descriptions of nature. We must mention in particular the *Meghadūta* ('Cloud Messenger') of Kālidāsa; the *Ritusanhāra* ('Circle of the Seasons') of the same poet; and the *Gitagovinda* of Jayadeva, describing the adventures of Krishna. Though the Hindus can boast of some excellent specimens of dramatic poetry, yet, on the whole, their dramas are much inferior to those of the Greeks or of modern Europe. The plays are written in mixed prose and verse, and the lower characters and all females are made to speak not in Sanskrit but in Prākrit, only the higher male characters using the former. The Hindu poetic tales and fables have exercised a most important influence on the whole literature of the East, and even on that of our own middle ages. Among the collections of this class are the *Panchatantra* ('Five Books'), from which Europe derived the fables of Bidpai (or Pilpay) and the *Hitopadesha* ('Salutary Instruction'), a somewhat later collection of the same materials; also the twenty-five *Tales of the Demon*, seventy *Tales of the Parrot* (which gave rise to the well-known stories of the *Seven Wise Masters*), etc. The *Kathā-sarit-sāgara* ('Ocean of Streams of Narration') compiled in the eleventh century, is an extensive collection of the best Indian tales. The scientific literature of India is likewise large. Grammar seems to have had a special fascination for the Hindus. The oldest extant grammar is that of Pānini, which belongs to the second or third century before Christ. In mathematics and astronomy the Hindus have greatly distinguished themselves, as also in medicine and philosophy.

Sans-souci (säṇ-sö-sē; French, 'without care'), a palace near Potsdam built for Frederick the Great in 1745-47, mainly interesting for its associations and relics.

Santa Ana, a city, county seat of Orange Co., California, 33 miles S. E. of Los Angeles. Commercial center of a rich agricultural and horticultural district; has canneries, beet-sugar factories, etc. Pop. 15,485.

Santa Ana, a city of Salvador, 28 miles N. W. of San Salvador. Pop. 59,713.

Santa Anna (sän'tä ä'nä), ANTONIO LOPEZ DE, a Mexican president, born in 1798; died in 1876. He expelled the Spaniards from Mexico, and

proclaimed the Mexican Republic in 1822. He was in the front during all the Mexican troubles and in 1833 became president. In 1836 he attacked the revolted Texans, showing great cruelty, but was defeated and taken prisoner by the Texans. He was released the following year and was again president in 1846 and in 1853-55.

Santa Barbara (bär'ba-ra), a city, county seat of Santa Barbara Co., California, on Pacific Ocean, 90 miles N. N. W. of Los Angeles. It is noted for its scenery and climate. Has oil wells, and exports of lima beans, fruit, walnuts, etc. It is served by the Southern Pacific R. R. Pop. (1910) 11,659; (1920) 19,441.

Santa Catharina (kä-tȧ-rē'nȧ), a southern state of Brazil; area, 20,785 square miles. It is watered by numerous streams, the soil is fertile, the climate mild, and the seasons regular. Sugar, coffee, rice, maize, mandioca, and wheat are the chief cultivated products. Agriculture and cattle-rearing are the chief industries. The capital is Desterro. Pop. about 580,000, including many German settlers.

Santa Clara, a town of Santa Clara Co., California, 47 miles S. E. of San Francisco. Here are the University of Santa Clara, Notre Dame Academy, and the old Santa Clara Mission. Pop. (1920) 5220.

Santa Clara, a city of Santa Clara province, Cuba. Tobacco, asphalt and petroleum are produced. Pop. 57,767. Area of province, 8266 sq. miles; pop. 657,697.

Santa Cruz (krös), a territory of Argentina; area, 109,142 sq. miles. Sheep are raised, and there is some farming. It has coal deposits. Capital, Gallegos. Pop. 10,859.

Santa Cruz, a department of Bolivia; 144,941 sq. miles in area. Coffee and other products are grown. Pop. about 350,000. The capital is Santa Cruz; pop. 7734.

Santa Cruz, capital and chief port of Canary Islands, on N. E. coast of Teneriffe. There is a good harbor. Pop. 82,219.

Santa Cruz, county seat of Santa Cruz Co., California, on Monterey Bay, 76 miles S. of San Francisco. Sequoia Park and the Big Trees are here. It has lime, cement, asphalt, and other plants. Pop. (1900) 5659; (1910) 11,146; (1920) 10,917.

Santa Fe (fā), a city, capital of New Mexico, in the northern part of which it is situated, 20 miles E. from the Rio Grande del Norte, 7043 feet above the sea. Many of the houses are built of unburnt or adobe brick in the Spanish style of architecture. There are many fine public buildings, including the Old Palace of the Governors. After St. Augustine, Santa Fé is the oldest settlement of Europeans in the United States, and it was the seat of an organized *pueblo* community many hundreds of years before Columbus discovered America. It is the center of a considerable mining industry; in the midst of a stock-raising district and in a very fertile irrigated valley. Pop. (1920) 7236.

Santa Fé, a town of the Argentine Republic, capital of the province of same name, situated at the confluence of the Salado with the Paraná, 230 miles N. N. W. of Buenos Ayres, on an unhealthy site. It is the seat of a bishop, has a cathedral, Jesuits' college, etc. The principal trade is in hides and timber. Pop. 59,574.

Santalaceæ (san-ta-lā'se-ē), a nat. order of apetalous exogenous plants. They are shrubs or herbs, with opposite or alternate exstipulate leaves, and a one-celled ovary with dry or fleshy albumen. In the form of weeds the genera are found in Europe and North America; in Australia, the East Indies, and the South Sea Islands they exist as large shrubs or small trees. *Santălum*, sandal-wood, is the chief genus.

Santal Parganas (sȧn-täl' pur-gun'äz), THE, a district in the Bhagalpur division of Bengal; area 5470 sq. miles. The Ganges, which bounds the district on the north and partly on the east, forms also its chief drainage. Various minerals, as coal, iron, and silver, have been found in this district. The district is named from the Santáls, who form the most characteristic portion of its inhabitants, and are also found elsewhere in India. They are one of the aboriginal races belonging to the Dravidian stock, are dark-colored, and mostly profess a religion of their own, in which the worship of a chief deity and subordinate deities and a sort of ancestor worship play a chief part. They live chiefly by hunting, and are exceedingly fond of flute-playing, dancing, and singing. Education has been promoted by the Church Missionary Society.

Santa Lucia. See *Lucia (St.)*.

Santal-wood, a dye-wood obtained from *Pterocarpus santalīnus*, a leguminous tree of the East Indies, Madagascar, etc.; also called sanders or saunders wood and red sandal-wood. *Santaline*, a substance obtained from it, is used in dyeing blue and brown.

Santa Maria di Capua-Vetere, a town of South Italy, in the province of Caserta, 3 miles southeast of Capua. It is built on the site of ancient Capua. Pop. 22,000.

Santa Maura. See *Leucadia.*

Santa Monica, a city of Los Angeles Co., California, on Pacific Ocean. With Ocean Park it forms practically one community. It is a summer resort and has the longest Pleasure Pier in the world. Pop. (1910) 7847, (1920) 15,252.

Santander (sän-taa·dār′), a city and seaport of N. Spain, capital of the province of same name, on the Bay of Biscay, with a good and secure harbor. In the more ancient quarter the streets are narrow and straight, while in the modern the streets are spacious, and the houses of good architecture. There is a town-house, small cathedral, theater, two public markets, promenades, etc. It has a large cigar manufactory, foundry, brewery, cooperages, fish-curing establishments, tanneries; besides manufactories of refined sugar, candles, vermicelli, hats, etc. It is also a resort for sea-bathing. Pop. 65,046.—The province is bounded by Biscay, Burgos, Palencia, and Oviedo, and has an area of 2111 square miles. The soil is fertile, and produces large quantities of maize, hemp, flax, oranges, lemons, figs, etc. There are also lead, coal, and iron mines, quarries of limestone and marble. The rearing of cattle is common, and the fisheries along the coast are well developed. Pop. 276,003.

Santarem (sän′tä-ron), a city of Portugal, beautifully situated in the province of Estremadura, on the right bank of the Tagus, 46 miles northeast of Lisbon. It has an important Jesuit seminary. Pop. 8628.

Santa Rosa (rō′za), a city, capital of Sonoma county, California, 57 miles N. by W. of San Francisco. It has various mills and factories, and an extensive trade, in a wine-growing and agricultural region. The climate is mild and equable. Fruit canning is an important industry. Pop. 8758.

Santerre (sän-tār), ANTOINE JOSEPH, born in Paris in 1752; died in 1809. As a wealthy brewer he was notable during the French revolution for his influence over the Parisian mob in the attacks on the Bastile and the Tuileries. He rose to be commander of the National Guard and a field-marshal.

Santiago (sän-tē-ä′gō), the capital of the Republic of Chile and of the province of the same name, is beautifully situated at the foot of the Andes, 112 miles by rail E. of Valparaiso. It is intersected by the Mapocho, a rapid stream issuing from the Andes, has water channels in many of the streets, is lighted by electricity, and furnished with tramways. Owing to the prevalence of earthquakes the houses are mostly of one story, and generally occupy a large space of ground, having gardens and patios or courts in the interior. The Plaza or Great Square is a large open area adorned with a fine fountain; around it are the municipal buildings and criminal courts, the post-office, the old palace, formerly the residence of the presidents, now used as barracks, the cathedral, etc. There are also a mint, a well-appointed university with about 1000 students, high-class secondary schools, school of art, military school, normal schools, theater, museum, etc. The city was founded in 1541. The most memorable event in its history was the burning of a church, in which about 2000 persons perished, in 1863. Pop. 378,103.

Santiago-de-Compostella (kom-pō-stä′la), a city of Spain in Galicia, in the province and 32 miles south of Coruña. It is picturesquely situated, and well built; streets for the most part broad and paved. The chief edifice is the cathedral, a Romanesque building founded in 1078, having in one of the chapels the image of St. James (Santiago) of Compostella (more correctly Compostela), which has long attracted numerous pilgrims. Other buildings are the archiepiscopal palace, the ecclesiastical seminary, the town-house, the convent of St. Martin, and the university. The town has manufactures of leather, linen, etc. Pop. 24,120.

Santiago-de-Cuba (kū′ba), a seaport town on the southeast coast of the Island of Cuba. It is the oldest town of the island (having been founded in 1514); has a fine cathedral, several other churches, and a harbor, which, though difficult of access, is spacious and deep. It is the center of a large agricultural and mining district, has important iron and tobacco manufactures, and exports largely to the United States. It was invested and taken by the Americans in the war of 1898. Pop. (1914) 61,513.

Santiago del Estero (äs-tä′rō), a town of the Argentine Republic, in the province of same name, in a fertile district on the Rio Dulce. Pop. 12,000.—The province has an area of 31,500 sq. miles, and is well suited for cattle-rearing and agriculture. Pop. 186,205.

Santipur (sän'tē-pör), a town in Nadiya district, Bengal, on the river Hooghly. It is well-known for its cloth manufactures, has an annual fair which lasts for three days, and a considerable local trade. Pop. 29,687.

Santley (sant'li), CHARLES, a public singer, was born at Liverpool in 1834; acquired a knowledge of his art in Italy under Gaetano Nava, and in London under Garcia; appeared for the first time in 1857, and achieved his first great success at the Handel Festival in the Crystal Palace in 1862.

Santo Domingo. See *San Domingo* and *Dominican Republic.*

Santonin (san'tu-nin), SANTONINE ($C_{15}H_{18}O_3$), a proximate principle, possessing acid properties, obtained from the seed of southernwood (*Artemisia santonica*). It is colorless, crystallizable, and soluble in alcohol.

Santorin (san-to-rēn'), THERA, or CALLISTE, the largest of a small group of islands in the Grecian Archipelago, 60 miles north of Crete. It is somewhat crescent-shaped, and has a circuit of about 30 miles, though its breadth nowhere exceeds 3 miles. The shores of the inner curve are precipitous, but they slope gradually down to those of the outer curve, which are covered with vineyards. Wine is the staple of the island. The island is of volcanic origin, and adjoining it are several small islands thrown up by eruptions in historic times, the last having taken place in 1866. Pop. about 15,000.

Santos (sän'tush), a city and seaport of Brazil, in the province and 50 miles S. S. E. of São-Paulo, on a bay of the South Atlantic. The harbor is the best in the province, and the chief outlet for its products, which are coffee, sugar, tobacco, hides, etc. Pop. about 90,000.

Santos-Dumont, ALBERTO, aeronaut, born at São Paulo, Brazil, in 1873, son of a wealthy coffee planter. He began experiments in aerostation at Paris in 1898, constructed a succession of air-ships, and in 1901 won the Deutsch prize of 100,000 francs by traversing a distance of about 8 miles, in which he sailed round the Eiffel Tower. On the invention of the aeroplane he was one of the first to experiment with it, and in 1906 won a prize of $10,000 by making a flight of one kilometer.

São-Francisco (soun-fran-sēsh'ku), a river of Brazil, rises in the southwest of the province of Minas-Geraes, flows N. N. E. through that province and the province of Bahia, forms the boundary between the latter province and Pernambuco, and falls into the Atlantic 50 miles N. N. E. of the town of Sergipe-del-Rey; length, 1600 miles, with numerous rapids and cataracts, which make its continuous navigation impossible.

Saône (sōn; anc. *Arar*), a river of E. France, rises in the Vosges, enters the department of Haute-Saône, then flows through the department of Côte-d'Or, continues southwest and receives the Doubs as tributary, reaches Châlon, where it flows due south until it joins the Rhone at Lyons; length, 280 miles, of which 190 are navigable. It is connected by canals with the Rhine, Loire and Seine.

Saône, HAUTE (ōt sōn; 'Upper Saône'), a department in the east of France; area, 2028 square miles. It is drained by the Saône, the Ognon, etc., and there are many small lakes. A part of the department belongs to the Vosges Mountains. This, which comprises about a fourth of the whole, is rugged and the soil arid, but the low-lying basin is well watered and productive. In addition to cereals flax and hemp are extensively cultivated; the ordinary fruits generally thrive well, and some districts are almost covered with cherry plantations. Iron is extensively worked, but the main occupation is agriculture. Vesoul is the capital. Pop. 265,179.

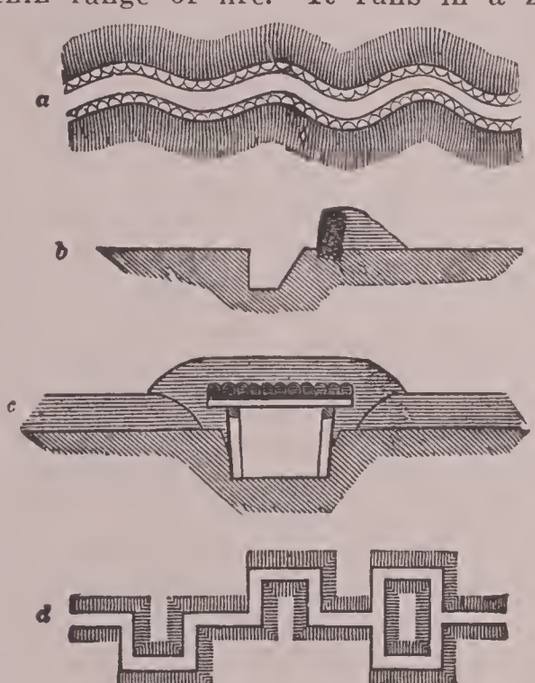
Saône-et-Loire (sōn-ė-lwär), a department of E. France; area, 3270 square miles. It is divided by a mountain range, which belongs to the Cevennes, and it takes its name from the two streams which bound the department on the southeast and west respectively. The soil on the whole is not of remarkable fertility, the finest part of the department being the valley of the Saône. The vine is extensively cultivated. The most important mineral is coal, of which there is an extensive field; iron is also worked. There are manufactures of leather, glass, linen and cotton goods; and the trade is chiefly in agricultural produce, coal, iron, wine, and leather. Mâcon is the capital. Pop. (1906) 613,377.

São-Paulo (soun-pou'lu), a maritime state of Brazil, between Minas-Geraes and Paraná; area, 112,312 square miles. The coast-line is bold and rocky; behind are mountain chains which divide the province into two basins. That on the east side sends its waters directly to the Atlantic; while the far larger interior basin drains into the Paraná, which bounds the province

on the west. The mountains are generally covered with forests, while on the lower slopes the crops grown are sugar-cane, coffee, cotton, maize, mandioc, tobacco, etc. The province has several harbors on the coast, particularly that of Santos. Pop. 2,282,279, including 300,000 Italian colonists and 20,000 Germans.— SÃO-PAULO, the capital, is the center of the provincial railways, 86 miles from its seaport, Santos, and 143 miles from Rio-de-Janeiro. The principal edifices are the cathedral, several monasteries and convents, the governor's and the bishop's palace, the town-house, etc. It is one of the oldest cities of Brazil, having been built in 1554, and is the industrial center of the state. Pop. estimated at 450,000.

Saouari (sȧ-ụ-ä′rē). See *Souari.*

Sap, in military affairs, a narrow ditch or trench by which approach is made to a fortress or besieged place when within range of fire. It runs in a zig-



Sap, as variously constructed.

zag, serpentine, or similar direction, so as not to be enfiladed by the fire of the fortress. The trench is formed by trained men (sappers), who place gabions as a cover, filled with the earth taken from the trench along the intended line of parapet; the earth excavated, after the gabions have been filled, being thrown up to form a parapet capable of resisting artillery. The single sap has only a single parapet; the double has one on each side. Sometimes the sap is entirely covered in. The digging of a sap is generally a dangerous operation. In the accompanying figure *a* is a double sap on the serpentine plan; *b*, section of single sap, showing portion of gabions; *c*, section of covered sap; *d*, sap on rectangular plan.

Sap, the juice or fluid which circulates in all plants, being as indispensable to vegetable life as the blood to animal life. It is the first product of the digestion of plant food, and contains the elements of vegetable growth in a dissolved condition. The absorption of nutriment from the soil is effected by the minute root-hairs and papillæ, the absorbed nutriment being mainly composed of carbonic acid and nitrogenous compounds dissolved in water. This ascending, or as it is termed *crude sap*, is apparently transmitted through the long cells in the vascular tissue of the stem and branches to the leaves, passing from cell to cell by the process known as endosmose, and changing in character under the influence of sunlight acting upon it through the leaf tissue. It then descends as elaborated plant food.

Sapajou (sap′a-jö), the name generally given to a group of South American prehensile-tailed monkeys, including fifteen or sixteen species, whose characteristics it is exceedingly difficult properly to define. Among the species may be named the *Cebus fatuellus*, or horned sapajou (also called horned capucin); the *C. monachus* and *C. capucinus*, often called the capucin. One of the most common species is the

Capucin Sapajou (*Cebus capucinus*).

weeper (*Cebus apella*). They are small in size, playful in disposition, leading a gregarious life, and feeding chiefly on fruits and insects.

Sapan-wood, SAPPAN-WOOD (sap'-an), the wood of the *Cæsalpinia Sapan*, a middle-sized leguminous tree, indigenous to Siam, Burmah, India, etc., and used as a dye-wood. The dye it yields is of a red color, but rather inferior.

Sap-green, a pigment prepared by evaporating the juice of the berries of the *Rhamnus catharticus*, or buckthorn, to dryness, mixed with a little alum. It is soluble in water; acids redden it, but the alkalies and alkaline earths restore the green color. It is used by water-color painters as a green pigment. Called also *bladder-green*, being kept in bladders to dry and harden.

Saphir (så'fēr), MORITZ, a German humorist, born at Pesth, of Jewish parentage, in 1795; died in 1858. At an early age he went to Berlin, and successively edited the *Berliner Schnellpost*, *Der Deutsche Horizont*, *Der Korsar*, and *Der Humorist*.

Sapindaceæ (sap-in-dā'se-ē), a nat. order of polypetalous dicotyledons. It consists of trees or shrubs with erect or climbing stems, inhabitants of most parts of the tropics, more especially of South America and India. The leaves are usually alternate, simple or compound, and the flowers often irregular. The fruit of the *Sapindus saponaria* is used for washing linen.

Sapodilla (sap-u-dil'a), a tree of the genus *Achras*, the *A. Sapota*, nat. order Sapotaceæ, and found in the West Indies. The fruit resembles a bergamot pear in shape and size. It is often called *naseberry*, and is much prized as an article of diet. The bark of the sapodilla is used in medicine as an astringent, and the seeds as a diuretic.

Saponine (sap'u-nin; $C_{32}H_{54}O_{18}$), a non-nitrogenous vegetable principle found in the root of *Saponaria officinālis* and many other plants. It is soluble in water, and its solution, even when much diluted, froths on being agitated like a solution of soap.

Saponite (sap'u-nīt), a hydrous silicate of magnesia and alumina. It occurs in soft, soapy, amorphous masses, filling veins in serpentine and cavities in trap-rock.

Sapotaceæ (sa-po-tā'se-ē), a nat. order of plants belonging to the polycarpous group of monopetalous exogens. It consists of trees and shrubs which frequently abound in a milky juice, which may be used for alimentary purposes. They have alternate undivided leaves, small solitary or clustered axillary flowers, and a baccate or drupaceous fruit. They are chiefly natives of India, Africa, and America. Some produce eatable fruits, as the sapodilla plum, marmalade apple, star apple, etc. One of the most important species is the *Isonandra Gutta*, which produces the gutta percha of commerce.

Sappan-wood. See *Sapan-wood*.

Sapper (sap'ėr), a soldier whose duties consist in constructing saps or other field-works, etc. Formerly the non-commissioned officers and privates of the Royal Engineers received the general appellation of the Sappers and Miners.

Sapphire (saf'īr), a precious stone, next in hardness and value to the diamond, belonging to the corundum class. Sapphires are found in various places, as Burmah, India, and Ceylon, in Asia; and Bohemia and Silesia, in Europe. The sapphire proper is a beautiful transparent stone of various shades of blue color. See *Corundum*.

Sappho (saf'ō), a distinguished Greek poetess, born at Mitylene, on the Island of Lesbos and flourished about 600 B.C. Little is known regarding her life, though she is made the subject of various legends. Of these may be mentioned the common story of her love for Phaon, which, being unrequited, caused her to leap down from the Leucadian Rock. At Mitylene Sappho appears to have been the center of a female coterie, most of the members of which were her pupils in poetry, fashion, and gallantry. Her odes, elegies, epigrams, of which only fragments have come down to us, display deep feeling and imagination. Her reputation among the ancients almost borders on extravagance.

Saprolegnia (sap-rō-leg'ni-a), a genus of fungi which grow on dead and living animals and plants in water, and form the characteristic feature of the salmon disease.

Sap-roller, a large gabion filled with another gabion of less diameter as well as with fascines. It is used by sappers, who roll it before them in digging a sap to protect them from the fire of the enemy. See *Sap*, *Gabion*.

Saprophytes (sap'ro-fīts), plants that feed on decaying organic matter. The Fungi are examples, some of them living on dead organisms, some on living ones. The former live on the bark of trees, and the leaf soil of forests and meadows (these include the mushrooms); the latter (as the molds and yeasts) on the juice of fruits and sugary solutions. Examples of saprophytes are also found in the Phanerogams and the Bacteria.

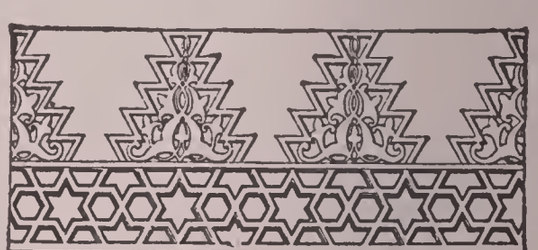
Sap-sucker, the popular name of several small woodpeckers.

Sapulpa, county seat of Creek Co., Oklahoma. It is in the center of the great Glenn, Drumright and Cushing Oil Pools and Gas Field. It has refineries, glass plants, cotton compress, etc. On the Frisco lines. Pop. (1910) 8283; (1920) 11,634.

Saraband (sar'a-band), a dance used in Spain, or the music adapted to the dance. This is grave and expressive in character, written in ¾ or ⅜ time, and consists of two parts.

Saracen (sar'a-sen), an Arabian or other Mussulman of the early and proselytizing period; a propagator of Mohammedanism in countries lying to the west of Arabia. By medieval writers the term was variously employed to designate the Arabs generally, the Mohammedans of Syria and Palestine, or the Arab-Berber races of Northern Africa. At a later time it was also applied to any infidel nation against which crusades were preached, such as the Turks.

Saracenic Architecture (sar-a-sen'ik), the style adopted by the followers of Mohammed in building their mosques, palaces, and tombs. Originally the Arabs possessed no distinctive architectural style, and the style which they at length made their own was developed by architects belonging to the countries which they had conquered. This style is chiefly represented in Egypt, Persia, Spain, Turkey, and India, but the Saracenic architecture of Spain is generally called by the distinctive name of Moorish. (See *Moorish Architecture.*) The most prominent features of the style are the dome, the minaret, and the pointed arch. The Saracenic domes rise from a square base, are graceful in form, sometimes in groups of three or more, and frequently enriched externally with colored tiles or other decorations. The minarets are slender towers of considerable height, rising in stages or stories, each with a balcony, and are most frequently octagonal, sometimes cylindrical, rising, however, from a square base. The arch is of the pointed variety, this form of arch having been used by the Arabs in Egypt before the rise of the Gothic in Europe. It is sometimes of the horseshoe form. (See *Arch.*) The use of clustered pendentives (*honeycomb work*) to form a transition from the quadrangular area under a dome to the arch of the dome itself is very peculiar and common. Externally the tops of walls are often finished off with an upright cresting, which may be regarded as an ornament taking the place of a cornice. Flat surfaces are freely ornamented with a profusion of scroll-work and conventional foliage, often in intricate and beautiful designs. Stucco is much used in ornamentation. The mosque el-Aksah at Jerusalem, reconstructed by Abd el Malek in A.D. 691, shows evidence of the Christian art of the time in its basilica of seven aisles. In Egypt the Saracenic art began with the mosque which Amru erected at Old Cairo in the 21st year of the Hejira (A.D. 642). Subsequently repaired and altered, it may now be considered as a good specimen of Moslem architectural art when freed from Christian influence. But the perfected Saracenic art dates from the building of a mosque at Cairo by Ibn Tooloon in 876 A.D. This building is nearly square (390 ft. by 455) with a central court, around which on three sides are two ranges of arcades, while on the side towards Mecca there are five. It is built of brick covered with stucco. The mosque and tomb of Kaid Bey, erected in 1463 outside Cairo, is one of the most graceful specimens of Saracenic architecture. When the Turks captured Constantinople in 1453 they appropriated the Christian churches of the city, the most important of which was St. Sophia. Such was their appreciation of this Byzantine building that they adopted its architectural style with modifications in all the mosques which they subsequently built there. The finest among these was built by Suleiman in 1550 A.D., and occupies nearly a square, being 225 ft. by 205. In Persia the Saracenic architecture is



Wall-cresting, Mosque of El-Azhar, Cairo.

supposed to be a development of the old Babylonian or Assyrian. The ruined mosque of Tabreez, one of the finest of its kind, belongs to the Mogul dynasty, and was begun by Ghazan Khan in 1294 A.D. In form it resembles a Byzantine church, but it is chiefly remarkable for the decorative results obtained by mosaic of glazed bricks and tiles in brilliant colors. The most splendid of Saracenic buildings in Persia was built during the dynasty of the Sufis by Shah Abbas (1585–1629) in his capital of Ispahan. This was the *Maidan*

or bazaar, a large rectangular area inclosed by an arcade two stories in height, and to which was attached the great mosque of Mesjid Shah and other buildings. The latter building is 223 ft. by 130, the center compartment being surmounted by a double dome, whose external height is 165 feet. Taken in the mass the Maidan Shah, with its gates and mosques, superbly decorated, is one of the most effective specimens of Saracenic architecture. See also *Indian Architecture.*

Saragossa (sär-å-gos'å), or ZARAGOZA, a city of Spain, in Aragon, capital of the province of the same name, 200 miles N.E. of Madrid in a fertile plain irrigated by the Ebro. The houses are built in solid masonry, and in a highly ornamental style. The principal edifices are the two cathedrals, La Seo and El Pilar. The former is the metropolitan archiepiscopal church, and is mainly Gothic in style, dating from the twelfth century; the latter is a huge unattractive building begun in 1677. Other buildings are the vast archiepiscopal palace, the Torre Nueva, an octangular clock-tower for the city, which leans about 9 feet out of the perpendicular; the old irregular citadel called the Aljaferia, built by the Moors, townhouse, university, etc. It was heroically defended against the French in 1808-09. Pop. 105,788.

Saranac Lake (sar'a-nak), a village of Franklin Co., N. Y., in Adirondack Mountains. Health and pleasure resort. Pop. 5174.

Saratoga, BATTLE OF, the name of two battles of the American Revolution fought at Schuylerville (Saratoga), New York, September 19 and October 7, 1777, between the British under Burgoyne and the Americans under Gates, who had succeeded Gen. Schuyler (q. v.). The first was indecisive; the second a great victory for the Americans, resulting in the surrender of Burgoyne with his whole force of nearly 6000 men. The victory, which was mainly due to the leadership of Benedict Arnold, secured for the Americans the alliance of France and led to the acknowledgment of the United States by foreign powers. Also called the battle of Bemis Heights, the battle of Stillwater and the battle of Freeman's Farm. See *Burgoyne.*

Saratoga Springs (sar-a-tō'ga), a city of New York, about 38 miles north of Albany, and 180 miles north of New York city by rail. It owes its prosperity to its mineral springs, which have made it one of the most fashionable resorts in the United States. The springs are characterized by their saline and chalybeate ingredients combined with carbonic acid gas. It has numerous large and handsome hotels, several churches, etc., and during the season has an influx of about 35,000 visitors. Pop. (1920) 13,181.

Saratov (så-rä'tof), a city of Russia, capital of the government of same name, is built on broken and undulating ground on the right bank of the Volga, 459 miles southeast of Moscow, and surrounded by gardens. Its streets are wide, regular, and well paved, and it has a number of fine buildings, including new cathedral, public offices, theater, railway-station, etc. It has manufactures of cordage, pottery, tobacco, woolen cloth, cotton and silk stuffs, etc. Pop. 217,500.—The government has an area of 32,614 square miles. The eastern boundary is formed by the Volga, but the greater part of the government is drained chiefly by affluents of the Don. The surface is generally diversified by numerous hills and valleys, where a mild climate and good soil combine in raising heavy crops. The principal exports are corn, hemp, flax, tobacco, hops, and madder. Pop. 2,419,884.

Sarawak (så-rä'wåk), a rajahship in the island of Borneo, under British protection. It is situated on the west and northwest side of the island, and has a coast-line of about 300 miles, and an undefined semicircular sweep inland, area about 40,000 square miles. The soil, consisting generally of black vegetable mold, is peculiarly adapted to the sugar-cane, which grows readily even without cultivation; but the more important vegetable productions are cocoanuts, rice, and sago. The minerals include gold, antimony, and quicksilver, and diamonds are also found. The original inhabitants are Dyaks, but are now very much intermixed with Malays and Chinese. The rajahship was conferred upon Sir James Brooke by the Sultan of Borneo in 1841 in return for distinguished services in quelling disturbances and restoring order, and when he died in 1868 he was succeeded by his nephew (see *Sir James Brooke*). The military force — some 250 men — is under English control. Pop. estimated from 300,000 to 600,000.— SARAWAK (formerly *Kuching*), its capital, has a pop. of about 30,000.

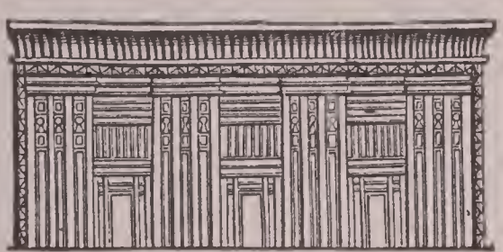
Sarcina (sur-sē'na), a genus of minute plants of low organizations and doubtful nature, but generally believed to be fungi, commonly found in matter discharged by vomiting from stomachs affected with cancer and certain forms of dyspepsia.

Sarcocarp (sår'ku-kårp), in botany, the fleshy part of certain fruits, placed between the epicarp and the endocarp. It is that part of fleshy fruits which is usually eaten, as in the peach, plum, etc.

Sarcocol (sår'ku-kol), SARCOCOLLA, a semitransparent gum-resin, imported from Arabia and Persia in grains of light yellow or red color, and formerly used medicinally.

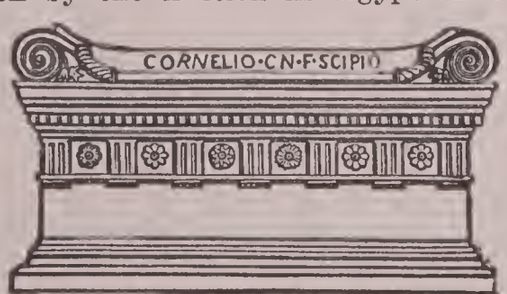
Sarcode (sår'kōd), the name given to the unorganized or structureless gelatinous matter forming the substance of the bodies of animals belonging to the division Protozoa. It is nearly equivalent to protoplasm, so that it is sometimes called 'animal protoplasm' or 'bioplasm.'

Sarcophagus (sår-kof'a-gus), a coffin or tomb of stone; a kind of stone chest, generally more or less ornamental, for receiving a dead body. The oldest known sarcophagi are



Egyptian Sarcophagus — Third Pyramid.

Egyptian, and have been found in certain of the pyramids. Two of the most celebrated of these are the great sarcophagus taken by the British in Egypt in 1801,



Roman Sarcophagus — Tomb of Scipios.

now in the British Museum, and the alabaster sarcophagus in the Soane Museum, London. Sarcophagi were also used by the Phœnicians, Persians, and Romans; and in modern times stone coffins have not been uncommon for royalty and persons of high rank.

Sarcorhamphus (sår-ku-ram'fus), a genus of vultures, including the condor and the king vulture.

Sard, a variety of chalcedony, which displays on its surface a rich reddish brown, but when held between the eye and the light appears of a deep blood-red carnelian. Called also *Sardoin.*

Sardanapalus (sår-dȧ-nȧ-pā'lus), the name in Greek of several kings of Assyria, one of whom is said to have been the last king of Assyria. He is represented by Ctesias as a very effeminate prince, wholly given to sensual indulgence and inactivity, and it is related that Arbaces, a Median satrap, in conjunction with Belesis, a Babylonian priest, raised an army of Medes against him about 785 B.C. This army, attacking his camp by night, gained a great victory, and pursued the fugitives to the gates of Nineveh. Here Sardanapalus defended himself for two years, but ultimately set his palace on fire and perished in the conflagration with all his wives and attendants. This story is fabulous, but in some respects the Sardanapalus story agrees with that of Saracus, the actual last king of Assyria. The name of Assur-bani-pal, the greatest Assyrian king, was also transformed into Sardanapalus. See *Assyria.*

Sardhana (sär-dä'nu), a town in the Meerut district of the Northwest Provinces of India, about 12 miles N. W. of Meerut. Pop. 12,467.

Sardica (sär'di-ka), anciently a town in Lower Dacia, on the site of the modern Turkish town of Sofia or Sophia. The town is chiefly celebrated as the place where an ecclesiastical council was held in 347, at which Athanasius defended himself against the Arians.

Sardine (sar'dēn; *Clupea sardina*), a small fish of the same genus as the herring and pilchard, abundant in the Mediterranean and also on the Atlantic coasts of France, Spain, and Portugal. It is much esteemed for its flavor, and large quantities are preserved by being salted and partly dried, then scalded in hot olive-oil, and finally hermetically sealed in tin boxes with hot salted oil, or oil and butter. The young of the herring and some other fishes are used in imitation of the sardine.

Sardinia (sär-din'i-a; Italian, *Sardegna*), an island in the western half of the Mediterranean, forming part of the Italian kingdom and separated from the island of Corsica by the Strait of Bonifacio, not quite 7 miles wide; length, 152 miles; central breadth, about 66 miles; area, 9350 square miles. The coast is in great part rugged and precipitous, and though the island is nearly in the form of a parallelogram there are

some important indentations, such as the Gulf of Asinara in the northwest, the Bay of Oristano in the west, and the Gulf of Cagliari in the southeast, on which Cagliari, the capital of the island, is situated. The interior is generally mountainous; the chain which traverses Sardinia sends out branches east and west, and culminates in Brunca, 6291 feet, and Gennargentu, 6132 feet. Between the mountain ridges are extensive plains or valleys. The streams are numerous, but unnavigable, the largest being the Tirso, which pours its waters into the Gulf of Oristano on the west coast. In the vicinity of the coast are a series of lagoons. As regards the geological structure of the island crystalline rocks occupy a considerable area, in which granite, overlaid by gneiss and mica-schist, predominates, but sedimentary rocks are also well represented, as also volcanic formations, a number of ancient craters being traceable. The mineral riches of the island consist chiefly of lead, zinc, copper, quicksilver, antimony, and iron of excellent quality. Iglesias, near the west coast, is the center of the mining district. The other minerals are porphyry, alabaster, marble, lignite, etc. The climate is similar to that which obtains generally over the Mediterranean region. The range of the thermometer is between 34° and 90°, and the mean annual temperature 61° 7′. During the hot season an unhealthy malaria infects the low-lying tracts. The winter months are rainy, and the pleasantest season is in the autumn. Much of the land is of remarkable fertility. The principal crop is wheat; barley, maize, beans, etc., are extensively grown; the vine is well adapted both to climate and the soil; and olive-grounds are met with in various quarters. The rearing of live stock forms an important industry. Game of all kinds is very abundant. Wild boars, stags, deer, and mufflons frequent the woods and forests. The most valuable fishery is that of the tunny. Manufactures are chiefly confined to a few coarse tissues woven by the women at their homes for private use. The trade consists of the exports of corn, wine, brandy, timber, fish, cattle, lead ore, calamine, salt, etc.; the imports include cotton, colonial produce, hosiery, hardware and metals, coal, etc. For administrative purposes Sardinia is divided into the two provinces of Cagliari and Sassari. The inhabitants are of Italian race, with a mixture of Spanish, and are characterized by a chivalric sense of honor and hospitality, but the family feud or *vendetta* still exists. Education is in a very backward state, and altogether civilization is rather primitive. The early history of the island is involved in much obscurity. It passed from Carthage to Rome in 238 B.C., and latterly came successively into the hands of the Vandals, the Goths, the Longobards, and Saracens. In 1297 Boniface VIII invested the kings of Aragon with Sardinia, and it continued in the possession of Spain till 1708, when it was taken possession of by the British. By the Peace of Utrecht it fell to Austria, and in 1720 to the House of Savoy, being from that time onward part of the kingdom of Sardinia. Capital, Cagliari. See next article. Pop. 791,754.

Sardinia, KINGDOM OF, a former kingdom of the south of Europe, composed of the Island of Sardinia, the Duchy of Savoy, the Principality of Piedmont, the County of Nice, the Duchy of Genoa, and parts of the Duchies of Montferrat and Milan; 28,229 square miles; pop. (1858), 5,194,807. In 1720 Victor Amadeus II, duke of Savoy, on receiving the island of Sardinia in exchange for Sicily, took the title of King of Sardinia. He was succeeded by Charles Emmanuel III, Victor Amadeus III, and Charles Emmanuel IV, who in 1802 abdicated in favor of his brother Victor Emmanuel I, the royal family having by this time, during the domination of Napoleon, taken refuge on the island of Sardinia. In 1814 the king returned to Turin, where the seat of government was established. An insurrection occasioned his abdication in 1821 in favor of Charles Felix, who, after a reign of ten years, was succeeded by Charles Albert. In 1848 he headed the league which endeavored to drive the Austrians from Italy. The defeat of the Sardinian forces at Novara (1849) by Radetsky, however, caused him to abdicate in favor of his son Victor Emmanuel II. The position of Sardinia was strengthened by the part which it played (1854) in the Crimean war, while in 1859 the coöperation of France was secured in a war against Austria. The brief campaign which followed ended in the defeat of the Austrians at Magenta and Solferino, and led to Sardinia receiving a large increase of territory, though she had to cede Savoy and Nice to France. Soon after this the Sardinian kingdom was merged in a united Italian kingdom under Victor Emmanuel. See *Italy*.

Sardis (sar′dis), or SARDES, the ancient capital of Lydia, on the river Pactolus, not far from the mount Tmolus. Under the Persians it was a

magnificent city on the commercial route from Asia to Europe. Sardis was the seat of one of the seven churches of the Apocalypse. A small village with some ruins stands at present on its site.

Sardonyx (sär-don'iks), a precious stone, a beautiful and rare variety of onyx, consisting of alternate layers of sard and white chalcedony. The name has sometimes been applied to a reddish-yellow or nearly orange variety of chalcedonic quartz resembling carnelian, and also to carnelians whose colors are in alternate bands of red and white.

Sardou (sar-dö), VICTORIEN, a French dramatist, born at Paris in 1831. The son of a professor, he at first studied medicine, but abandoned this in favor of literature. His earliest venture was the comedy of *La Taverne des Étudiants*, which proved a failure at the Odéon. He was successful, however, with two plays which he wrote for Déjazet called *M. Garat* (1860) and *Les Prés-Saint-Gervais* (1862). His better-known works, many of which have been produced on the English stage, are *Les Pattes de Mouche*, *Nos Intimes*, *La Patrie*, *Daniel Rochat*, and *Dora*. His later successes were associated with Madame Bernhardt, for whom he wrote *Fédora*, *Théodora*, and *La Tosca*. He died November 8, 1908.

Saree (sa'rē), a cotton fabric worn by Indian women to wrap round the person; also, an embroidered long scarf of gauze or silk.

Sargasso Sea, the name given to several immense areas of floating vegetation found in mid-ocean in different parts of the earth, and formed by a sea-weed named *Sargassum bacciferum*, and known popularly as gulf-weed, sea-entils, sea-grasses, and sargasso. The most celebrated of these occupies a great section of the Atlantic between Africa and the West Indies, from 20° to about 65° W. lon., and 20° to 45° N. lat. It was first traversed by the ships of Columbus. This vast meadow of floating sea-weed is also remarkable for the great variety of animal life inhabiting it, all these animals (crustacea, annelids, molluscs, polyzoa, fishes, etc.), being of the same general tint as the weed, so that they are often difficult to discover at first sight. The weeds are supposed to be carried to this position by ocean currents, and continue to grow here, though they do not produce roots or fruit. See *Gulf Weed*.

Sargent, CHARLES SPRAGUE, botanist, born at Boston, Massachusetts, in 1841. He served as a volunteer staff-officer in the Civil war and afterwards was made director of the botanic garden and then of the arboretum of Harvard University, and professor of horticulture. He also edited *Forest and Stream* (1887–97), and was made a member of the National Academy of Sciences in 1895. He is the author of numerous works on the forests of North America and on other botanical subjects.

Sargent, JOHN SINGER, artist, born at Florence, Italy, in 1850, the son of an American doctor. He studied in Paris, and received a medal of honor at the Paris Exposition of 1889, and the cross of the Legion of Honor the same year. His *La Carmencita* was bought by the French government in 1892. He was noted especially as a portrait painter.

Sargent (sar'jint), EPES, poet and dramatist, was born at Gloucester, Massachusetts, in 1812. He was educated in the latter city and at Harvard University; became associated with the *Boston Advertiser* and the *Atlas;* removed to New York, where he was assistant on the *Mirror;* and subsequently returned to Boston to become editor of the *Evening Transcript*. He afterwards devoted himself entirely to literature, and produced, among other plays, *The Bride of Genoa*, a poetical drama; *Velasco*, a tragedy; various novels and books of adventure; a *Life of Henry Clay* (1852); and two volumes of poetry. He was the author of that well-known lyric, *A Life on the Ocean Wave*. He died December 30, 1880.

Sargon (sär'gon), an Assyrian king. See *Assyria*.

Sari (sä-rē'), a town of Persia, capital of the province of Mazanderan, 22 miles east of Balfrush, and 15 miles from the shore of the Caspian. A considerable trade is carried on with the interior of Persia and the Russian government of Astrakhan. Pop. estimated from 8000 to 20,000.

Sark (särk), or SERCQ, one of the Channel Islands, situated about 8 miles from Guernsey. It is divided into Great Sark and Little Sark, the connection between these being a narrow neck of land called the Coupée; length about 5, and breadth about 3 miles. The island is surrounded by almost inaccessible rocks, and the carriage-ways are steep. Fishing is the chief employment though some degree of agriculture is carried on. Pop. 506.

Sarlac, SARLIK (sar'lik), a name of the yak. See *Yak*.

Sarmatians (sar-mā'she-anz), a people of supposed Asiatic race, who, in the time of the Romans, occupied the vast region between the Black, Baltic, and Caspian seas. They were a nomadic race, whose women went to war like the men, and they were said by tradition to be descended from the Amazons by Scythian fathers. Sarmatia coincided in part with Scythia, but whether the people were of the same race is doubtful.

Sarnen (zar'nen), a town in Switzerland, capital of the canton of Unterwalden, near a lake of the same name, where the Aa issues from it, 11 miles S. S. W. of Lucerne. Pop. 3949.

Sarnia (sär'ni-a), a town of Canada, province of Ontario, on the river St. Clair, near where it issues from Lake Huron, and opposite Port Huron. It is a flourishing place, with various manufactures, and a large trade, by railroad and steamer. Pop. 11,000.

Sarno (sär'nō), a town of Southern Italy, in the province of Salerno, at the foot of the Apennines, near the source of a river of the same name, 12 miles N. N. W. of Salerno. It is well built, has a cathedral (1625), mineral springs, copper and other foundries, paper-mills, etc. Pop. 15,130.

Sarong (sa-rong'), a garment used in the Indian Archipelago. It consists of a piece of cloth wrapped round the lower part of the body. The sarong is worn by men and women.

Saronic Gulf (*Sinus Saronicus*), the ancient name of the Gulf of Ægina.

Sarony (sa-rō'ni), NAPOLEON, artist, born at Quebec, Canada, in 1821; died in 1896. Beginning as a lithographer, he opened a photographic studio in New York after the Civil war, and became the most popular artist in his line. His great collection of photographs numbered over 60,000, including the most notable Americans of his time and many distinguished Europeans.

Saros (sar'os), a cycle of eclipses, being 18y. 10d. 7h. and 42m. during which all eclipses, whether solar or lunar, occurring in one saros are repeated in the next saros and nearly in the same order. This cycle was known to the Babylonians, but its cause was not known until long after.

Sarothamnus (sar-o-tham'nus), a genus of leguminous plants. *S. scoparius* is the well-known broom, the *Cytisus scoparius* of De Candolle.

Sarpedon (sår-pē'don), in Greek mythology, a son of Zeus and Laodamia, king of the Lycians and ally of the Trojans. He was slain by Patroclus.

Sarpedon (*Papilio Sarpēdon*), a beautiful species of butterflies found in Asia, Australia, and the Sandwich Islands.

Sarpi (sår'pē), PIETRO, known also as FRA PAOLO, born at Venice in 1552; died in 1623. He entered the order of the Servites, and became their procurator-general in 1585. Sent to the Venetian Republic as representative from Pope Paul V in the controversy of Church and State, Sarpi upheld the claims of the republic, and in consequence was excommunicated. In the seclusion of his cell he wrote and published under the pseudonym of Pietro Soave Polano an elaborate attack on papal policy called *Istoria del Concilio Tridentino* ('History of the Council of Trent').

Sarplar (sår'plar), a large sack or bale of wool containing 80 tods; a tod contains 2 stone of 14 pounds each.

Sarraceniaceæ (sar-a-sen-i-ā'se-ē), a nat. order of polypetalous exogens which consists of herbaceous perennial plants, remarkable for their pitcher-like leaves. There are three genera (*Sarracenia*, *Darlingtonia*, and *Heliamphora*) the species of which are inhabitants of northern or tropical America. The pitcher-like leaves of *Sarracenia* are capable of holding water, and the older leaves are usually full.

Sarsaparilla (sår-sa-pa-ril'a), the rhizome of several plants of the genus *Smilax*. *S. medica* supplies the sarza of Vera Cruz. *S. siphilitica*, or *S. papyracea*, yields the Lisbon or Brazilian sort. *S. officinālis* belongs to Central America, although it yields the kind known as Jamaica sarsaparilla. *Hemidesmus indicus* (an asclepiadaceous climber) yields the East Indian sort. Sarsaparilla is valued in medicine on account of its mucilaginous and demulcent qualities.

Sarsen (sår'sen), SARSEN-STONE, a name given to the large flat blocks of sandstone found lying on the chalk-flats or downs of Wiltshire, etc. Also named *gray wether* and *druids' stone*.

Sarsia (sår'si-a; from the Norwegian naturalist *Sars*, 1805–69), a genus of cœlenterate animals, belonging to the Medusidæ or jelly-fishes, and perhaps more properly regarded as the floating reproductive buds or gonophores of fixed zoöphytes.

Sartain (sar'tān), JOHN, engraver, was born in London, England, Oct. 24, 1808; came to the United

States in 1830, and was one of the first to introduce mezzotint engraving. He settled in Philadelphia, held various offices in the Artists' Fund Society, the School of Design for Women and the Pennsylvania Academy; was elected a member of the Society Artis et Amicitiæ in Amsterdam, Holland, in 1862, and in 1876 had charge of the art department at the Philadelphia Centennial Exposition. He was the author of a large number of engravings for book illustration, and engraved many historical paintings; designed the monument to Washington and Lafayette in Monument Cemetery, Philadelphia. He founded *Sartain's Magazine* and published interesting personal reminiscences. He died October 25, 1897.

Sarthe (sårt), a department of Northwest France; area, 2410 sq. miles. It has a diversified surface, presenting fertile plains, vineyards, and extensive forests. Wheat, oats, barley, beetroot, and hemp are grown, while cider and wine are largely produced. The only mineral of any consequence is iron, but there are excellent sandstone, limestone, millstone, slate, and marble quarries. The capital is Le Mans. Pop. 421,470.

Sarti (sår'tē), GIUSEPPE, an Italian composer, born in 1729; died in 1802. At the age of twenty-two his first opera, *Pompeo in Armenia*, was put upon the stage at Faenza, his native place. Other operas soon followed, and he became successively court chapel-master at Copenhagen; director of the Conservatory dell' Ospedaletto at Venice, and chapel-master of the Milan cathedral. In 1784 he was invited by the Empress Catherine to St. Petersburg, where he founded a musical conservatory. He wrote, in all, about thirty operas, and was for some time teacher to Cherubini.

Sarto (sår'tō), ANDREA DEL, a painter of the Florentine school, one of the most distinguished painters of the sixteenth century, born at Florence in 1486; died of the plague in 1531. His proper name was Andrea d'Agnolo, the name del Sarto (of the Tailor) being applied to him from the occupation of his father. He painted many frescoes in his native city, and Francis I induced him to go to France in 1518. He soon returned to Italy, and having appropriated large sums which had been given him by his royal patron to purchase the pictures of great masters in Italy, he could not go back to France. Among his most important easel-pictures are the *Sacrifice of Abraham* and the *Marriage of St. Catherine*, in the gallery of Dresden; the *Madonna di San Francesco*, an *Annunciation*, and an *Assumption of the Virgin*, at Florence; *Virgin and Child with St. Joseph*, at Madrid. He is best known in galleries by his *Holy Families*. He was highly distinguished for his excellence in fresco, and it was in this form of art that his naturalness of design, fineness of color, and careful execution became most apparent.

Sartorius Muscle (sår-tō'ri-us), or 'tailor's muscle,' in anatomy, a muscle of the thigh, so called from the fact that by its contraction the legs are crossed in sitting in the manner in which tailors usually do.

Sarts, the name given the settled inhabitants of Turkestan, Afghanistan, Persia, and adjacent regions of Asia, as distinguished from the nomad desert dwellers. The word is often used to designate the Aryan aborigines of those regions, who properly are called Tajiks.

Sarzana (sär-dzä'nà), a town of N. Italy, province of Genoa, 8 miles east of Spezia, near the Magra. It has a cathedral in the Italian Gothic style (1355-1470). Pop. (commune) 11,850.

Sarzeau (sår-zō), a sea-bathing town of France, department of Morbihan, on the south side of the Bay of Morbihan, 14 miles from Vannes. Pop. 5704.

Sasin (sas'in), the common Indian antelope (*Antilope cervicapra*), remarkable for its swiftness and beauty. It is abundant in the open dry plains of India, in flocks of from ten to sixty females to a single male. It is grayish-

Sasin or Indian Antelope (*Antilope cervicapra*).

brown or black on the upper parts of the body, with white abdomen and breast, and a white circle round the eyes, and stands about 2 feet 6 inches high at the shoulder.

Saskatchewan (sas-kach'e-won), a great river of Canada which rises in the Rocky Mountains near lon. 115° w. by two principal heads, the sources of which are not far apart.

These branches, often called the North and the South Saskatchewan, flow generally east to their junction about 150 miles northwest of the northwest angle of Manitoba, whence the river takes a curve northeast and southeast, and, passing through Cedar Lake, empties itself into Lake Winnipeg, after a course of about 1300 miles, measuring along the south branch, some 70 less measuring along the north.

Saskatchewan, a former district, now a province of Canada, named from the above river, bounded on the S. by the United States, E. by Keewatin district and Manitoba, N. by Mackenzie district, and W. by Alberta. The new province embraces the greater part of the old district and of the former districts of Athabasca and Assiniboia. Area 250,650 square miles. Grain, especially wheat, and cattle raising are the principal industries, and dairying is developing under government encouragement. This province forms part of the great wheat district of Canada, nearly 100,000,000 acres being under wheat and other grains. The wheat yield of less than 5,000,000 bushels in 1898, had increased to 112,369,405 by 1913, together with 110,210,636 bushels of oats. Capital, Regina. Pop. (1911), 492,432.

Saskatoon, a town in the province of Saskatchewan, Canada, on South Saskatchewan River; 160 miles N. of Regina. It is the seat of Provincial University, Agricultural College and Experimental Farm. The industries include cereal plant, brewery, tractor, garment and woodworking factories, brick plants, etc. Pop. 30,000.

Sassaby (sas'a-bi) (*Damălis lunātus*), an antelope found in South Africa, living gregariously in herds. The body-color is a reddish-brown, the limbs being of dark hue, while a blackish stripe marks the forehead and face.

Sassafras (sas'a-fras), a genus of plants, nat. order Lauraceæ. The species most known is the *S. officinale* (the sassafras laurel), on account of the medicinal virtues of its root. It is a small tree or bush inhabiting the woods of North America from Canada to Florida. The taste of sassafras is sharp, acrid, aromatic; it is used for flavoring purposes, and in medicine as a stimulant. *Swamp-sassafras* is the *Magnolia glauca,* an American tree.

Sassanidæ (sas-san'i-dē), a Persian dynasty of kings, which succeeded the Parthian dynasty of the Arsacidæ, and reigned from 226 B.C. to about A.D. 636. The dynasty began with Ardishír Babigán, and owes its name to the grandfather of that prince, named Sassan.

Sassari (säs'sä-rē), a town of Italy, in Sardinia, capital of the province of same name, 105 miles N. N. W. of Cagliari. It has a large cathedral, several palaces, a picturesque castle, a university, hospital, etc. The only manufacture of importance is tobacco, and the trade is chiefly in grain, oil, cheese, and goat-skins. Pop. of town, 34,897; of province occupying the north and more fertile part of the island, 308,206.

Sasseram (säs'ĕr-äm), a town of India, in Bengal, about 70 miles S. E. from Benares. The town, otherwise of small importance, contains the tomb of the Afghan Shere Shah, who became Emperor of Delhi. Pop. about 20,000.

Sassoferrato (sa-so-fer-ā'tō), a painter, so-called from the place of his birth, a town in the province of Ancona, in Italy. His true name was *Giambattista Salvi.* He was born in 1605; and died in 1685. His paintings were chiefly the *Madonna and Child,* the latter sleeping.

Sassolin (sas'u-lēn), native boracic acid, occurring as a deposit from hot springs and ponds in the lagoons of Tuscany, and first discovered near *Sasso,* in the province of Florence.

Satali'eh. See *Adalia.*

Satan. See *Devil.*

Satara (sä-tä'ru), a district, in the Bombay Presidency, India; area, 4987 sq. miles, forming part of the table-land of the Deccan, much broken by ridges, ravines, and isolated heights. The chief river is the Kistna, which flows southeast through its center.—The capital of the district is also called Satára, and is situated 55 miles south of Poona, near the confluence of the Krishna and the Yena. Pop. 30,000.

Satellite (sat'e-līt), a secondary planet, or moon; a small planet revolving round a larger one. The earth has one satellite, called the moon; Neptune is also accompanied by one; Mars by two; Uranus by four; Jupiter by seven; Saturn by ten. Saturn's rings are supposed to be composed of a great multitude of minute satellites.

Sateen (sat-ēn'), a woolen or cotton fabric, with a glossy surface in imitation of satin. It is made thin and light, or stout and heavy, for different uses, as for dresses, linings, etc.

Satin (sat'in), a soft, closely-woven silk, with a glossy surface. In the manufacture of satin part of the weft

is left beneath the warp, which, presenting a close and smooth surface, acquires, after being passed over heated cylinders, that luster which distinguishes it from other kinds of silks.

Satin-bird, an Australian bird, the *Ptilonorhynchus holosericeus*, so-called from the glossy dark-purple plumage of the male. It is one of the bower-birds (which see).

Satinet (sat-i-net'), a twilled cloth made of woolen weft and cotton warp pressed and dressed to produce a glossy surface in imitation of satin.

Satin-spar, a variety of calc-spar or carbonate of lime, distinguished by a silky luster and fibrous structure. The name is also sometimes applied to fibrous gypsum or sulphate of lime.

Satin-wood, the wood of a large tree of the genus *Chloroxylon*, the *C. swietenia*, nat. order Cedrelaceæ. It is a native of the mountainous parts of the Circars in the East Indies. The wood is of a deep yellow color, close-grained, heavy and durable and has a silky luster.

Satire (sat'ir), in the widest sense of the word, pungent ridicule or cutting censure of faults, vices, or weaknesses. In a narrower sense it is a poem, of which ridicule and censure are the object and chief characteristic. This species of poetry had its origin with the Romans, but satires may also take the forms of epistles, tales, dialogues, dramas (as with Aristophanes), songs, epics, fables, etc. The didactic satire originated with Lucilius (148–103 B.C.), and Horace, Juvenal, and Persius developed it. Satirists are common in all modern literature.

Satlej. See *Sutlej.*

Satrap (sat'rap, sā'trap), in the ancient Persian Empire, the name given the governors of the provinces which were called *satrapies*. The power of the satrap, so long as he retained the favor of his sovereign, was absolute; he levied taxes at his pleasure and aped the capricious tyranny of his master unchecked.

Satsuma Ware, the most famous variety of Japanese pottery, so called from being introduced by the formerly powerful princes of Satsuma. It is of a pale yellow color, with minute crackles in the glaze, very richly painted and lavishly gilt. Modern Satsuma is of deeper yellow tinge than the genuine old ware. The Japanese also excel in making egg-shell porcelain, so called from its extreme thinness. The chrysanthemum is a favorite flower in their vase decorations; the crane and other birds are introduced, and figures of warriors and women are effectively employed.

Saturation (sat-ū-rā'shun). In meteorology the air is said to be saturated with aqueous vapor, if, when the temperature is slightly lowered, condensation takes place. The degree of saturaton at any place is called the hygrometric state. (See *Hygrometer.*) The term is applied in chemistry to the union, combination, or impregnation of one body with another in such definite proportions as that they neutralize each other, or till the receiving body can contain no more.

Saturday (sat'ur-dā; A. Sax. *Sæterdæg, Sæterndæy* — *Sæter, Sætern*, for *Saturn*, and *dæg*, a day—the day presided over by the planet Saturn), the seventh or last day of the week; the day of the Jewish Sabbath.

Saturn (sat'urn), an ancient Italian diety, popularly believed to have made his first appearance in Italy in the reign of Janus, instructing the people in agriculture, gardening, etc., thus elevating them from barbarism to social order and civilization. He was consequently elected to share the government with Janus, and his reign came afterwards to be sung by the poets as 'the golden age.' He was often identified with the Cronus of the Greeks. His temple was the state treasury. Ops was his wife. He is often represented as an elderly man, with a sickle and ears of corn in his hand. See *Saturnalia.*

Saturn, one of the planets of the solar system, less in magnitude than Jupiter, and more remote from the sun. Its mean diameter is about 70,000 miles, its mean distance from the sun somewhat more than 872,000,000 miles, and its year or periodical revolution round the sun nearly twenty-nine years and a half. Its mass is about 90 times that of the earth. Saturn is attended by ten satellites, two of them of recent discovery and very small size, and is surrounded by a system of flat rings, which are now supposed to be an immense multitude of meteoric masses, mixed probably with vaporous matter. See *Planet.*

Saturnalia (sat-ur-nā'li-a), a festival held by the Romans in honor of Saturn, and during which the citizens, with their slaves, gave themselves up to unrestrained freedom and mirth. It embraced at first one day; then three; afterwards five; and finally, under the Cæsars, seven days, namely, from the 17th to the 23d of December.

During its continuance no public business could be transacted, the law courts were closed, the schools kept holiday, and slaves were freed from restraint. Masters and slaves even changed places, so that while the servants sat at table, they were waited on by their masters.

Satyrs (sat'erz), in Greek mythology, a class of woodland divinities, in later times, inseparably connected with the worship of Dionysus (Bacchus). The satyrs appear in works of art as half-man and half-goat, having horns on the head, and a hairy body with the feet and tail of a goat. They are described as being fond of wine and of every kind of sensual gratification. One of the most famous specimens of Greek art is the Satyr of Praxiteles.

Sauerkraut (sou'ėr-krout), a favorite German dish, consisting of cabbage cut fine, pressed into a cask, with alternate layers of salt, and suffered to ferment till it becomes sour.

Saugor, or SAGAR (sä'gur), a district of the Jabalpur division, Central Provinces, India; area, 4005 sq. miles. In some parts the soil is good, and wheat is grown in large quantities. The district is administered by a deputy commissioner.—The principal town has the same name, and is situated near a fine lake surrounded by hills, about 180 miles north of Nagpur. The town is well built, and has a considerable trade and a military cantonment. Pop. 42,330. —SAUGOR is also the name of an island of Bengal, in the Ganges delta, E. of the mouth of the Hugli. It is visited annually by multitudes of pilgrims and is the seat of a great annual fair. It was devastated by a tidal wave in 1864, when most of the inhabitants perished.

Saul (sąl), king of Israel from about 1095 B.C.–1056 B.C., and the son of Kish, a Benjamite. Selected for this office by Samuel, he obtained, by his personal courage and military capacity, several successes over the Philstines, Edomites, Moabites and Ammonites, by means of which he consolidated the tribes and confirmed his authority. After a long reign the wild nature of the king at length showed itself in a kind of religious frenzy. This frenzy, which is briefly described in the Bible as an 'evil spirit of God,' led him to the massacre of the priests of Nob and various similar excesses. Meanwhile the prophet Samuel, estranged by the king's misdeeds, had anointed David as his successor. Saul, with three of his sons, was killed in a battle with the Philistines.

Saugus (są'gus), a town of Essex Co., Mass., 8 miles N. of Boston, on Lynn Harbor. It has manufactures of rubber goods, flannel, rock drills, woolens, leather, brick, etc. Pop. (1910) 8047; (1920) 10,847.

Sault Ste. Marie (sö sânt-mā'ri), a city, county seat of Chippewa Co., Michigan, located at the Falls of the St. Marys River, at the outlet of Lake Superior. The Soo locks, built by the Federal government at a cost of $25,000,000 at this point, together with the St. Marys River, constitute the greatest inland waterway in the world, carrying about 100,000,000 tons of freight annually. Extensive water power is derived from the Falls, equally divided between Sault Ste. Marie, Michigan and Sault Ste. Marie, Ontario. It is used principally for the manufacture of carbide, leather, woolen goods, forest products, steel and paper. Pop. (1920) 12,096.

Sault Ste. Marie, a town and port of entry of Ontario, Canada, on St. Marys River, connecting Lakes Superior and Michigan. Its products are pulp and paper, chemicals, iron and steel, etc. Pop. 20,529.

Saumarez, or SAUSMAREZ (sō'ma-rā), JAMES, BARON DE, an English admiral, born in St. Peter Port, Guernsey, in 1757; died in 1836. He was with Sir Peter Parker in the attack on Charleston (1776); in 1793 was knighted for the capture of a French frigate; in 1795, in command of the *Orion*, seventy-four, opened the battle of L'Orient, where the French fleet was defeated; shared in the victory off Cape St. Vincent (1797); and was second in command to Lord Nelson in the victory of the Nile (1798). On his return to England he was made rear-admiral of the blue. In 1801 he defeated a Franco-Spanish fleet of ten sail of the line and four frigates, his own squadron consisting of only half that number. For this action he received the thanks of both houses of parliament, and a pension of £1200 per annum. In 1831 he was raised to the peerage.

Saumur (sō-mür), a town of Northwest France, department of Maine-et-Loire, on the Loire, 25 miles S. S. E. of Angers. It is irregularly built, has an old castle (dating from 1240), now an arsenal and gunpowder factory, three ancient churches, a court-house, town-house, communal college, military and other schools, etc. Sparkling white wines are extensively grown in the neighborhood. Pop. (1906) 14,747.

Sauria (sąr'i-a), the term by which the great order of lizards is sometimes designated, including not only the existng lizards, crocodiles, monitors,

iguanas, chameleons, etc., but also those fossil reptiles the ichthyosaurus, plesiosaurus, iguanodon, pterodactyle, etc.

Sauroid Fishes (sạr'oid), fishes, chiefly fossil, that combine in their structure certain characters of reptiles. The existing sauroid fishes consist of several species, the best known being the bony pikes and sturgeons.

Sauropsida (sạr-op'si-da), Professor Huxley's name for the second of his three primary sections of vertebrates, comprising birds and reptiles. The animals of this section are characterized by the absence of gills, by having the skull jointed to the vertebral column by a single occipital condyle, the lower jaw composed of several pieces, and united to the skull by means of a special (quadrate) bone, and by possessing nucleated red blood corpuscles, as well as by certain embryonic characters.

Sauropterygia (sạr-op-tėr-ij'i-a), an extinct order of reptiles, of which the *Plesiosaurus* may be regarded as the type.

Saururæ (sạr'ū-rē; 'lizard-tails'), an extinct order of birds, including only a single member, the *Archæopteryx*, which has a lizard-like tail longer than the body. See *Archæopteryx*.

Saury-pike (sạ'ri), a fish of the genus *Scomberesox*, family Scomberesocidæ, and order Pharyngognathi, having a greatly elongated body covered with minute scales. The jaws are prolonged into a long sharp beak. One species (*S. saurus*), about 15 inches long, occurs plentifully on the British coasts, frequenting firths in shoals so dense that it may be taken in pailfuls. In order to escape the pursuit of the porpoise and large fishes it often leaps out of the water or skims rapidly along the surface, whence it has obtained the name of *skipper*.

Sausage (sạs'ij), an article of food, consisting of chopped or minced meat, as pork, beef, or veal, seasoned with sage, pepper, salt, etc., and stuffed into properly cleaned entrails of the ox, sheep, or pig, tied at short intervals with a string. When sausages are made on an extensive scale the meat is minced and stuffed into the intestines by machinery.

Saussure (sō-sür), Horace Benedict de, a Swiss savant, born near Geneva, in 1740; died in 1799. At the age of twenty-two he was appointed professor of philosophy in the University of Geneva, and continued to discharge the duties of this office for twenty-five years. A favorite object of his investigations was the structure and height of mountains; and he rendered valuable services to physics, geology, etc. Among his writings are *Essais sur l'Hygrométrie* and *Voyages dans les Alpes*.

Sauterne (sō-tern), a white Bordeaux wine of high repute, produced from grapes grown in the neighborhood of *Sauternes*, a village in the department of Gironde, S. E. of Bordeaux.

Savage (sav'ij), Richard, a poet and literary character who has been made famous by Dr. Johnson in his *Lives of the Poets*. Born at London in 1698, he claimed to be the illegitimate son of Richard Savage, Earl Rivers, by the Countess of Macclesfield. The mysterious story of his birth and the protracted persecution to which he claimed to have been subjected by his mother, although believed by Dr. Johnson, have not been above suspicion. What is certain is that he was apprenticed to a shoemaker, and displayed his literary capacities in the two comedies of *Woman's a Riddle* and *Love in a Veil*. These efforts procured him favorable notice, and he afterwards produced his tragedy of *Sir Thomas Overbury*, and the poems, the *Bastard* and the *Wanderer*. In 1727 he was condemned to death for killing a Mr. Sinclair in a tavern brawl, but his pardon was procured. Thereafter he lived upon the bounty of his friends and a pension from government of £50; but his dissipation and extravagance eventually brought him, at the instance of his creditors, to Newgate, where he died in 1743.

Savage (sav'ij), Minot Judson, a clergyman, born at Norridgewock, Maine, in 1841; died in 1918. He began as a Congregationalist preacher, but joined the Unitarians, and was minister of the Church of the Unity, Boston, 1874-96, afterwards the Church of the Messiah, New York. He became widely known as an exponent of radical evolutionary views, also of spiritualistic doctrines. He wrote many works of evolutionary theology and in support of the theory of Spiritualism, including *Life Beyond Death*, etc.

Savage Island, a small coral island in the Pacific Ocean, lat. 19° s., lon. 170° w. It is about 30 miles in circuit, and has a population of 5000 nominal Christians. It was annexed by Britain in 1888.

Savanna, Savannah (sa-van'a), an extensive open plain or meadow in a tropical region, yielding pasturage in the wet season, and often having a growth of undershrubs. The word is chiefly used in the Southern United States.

Savanna, a city of Carroll Co., Illinois, on Mississippi River. It ships lumber, grain and livestock. Pop. (1920) 5237.

Savannah, a river between Georgia and South Carolina, formed by junction of Tugaloo and Seneca rivers; length, 450 miles; flows into Atlantic Ocean.

Savannah, a city, the seat of Chatham county, Georgia, on the south bank of Savannah River, 18 miles from the sea. It is built on a flat sandy bluff 40 feet high, and is beautifully laid out with wide streets and many squares, most of which are adorned by magnolias, live-oaks, and other stately trees. It has the beautiful Forsyth Park, with its varied and attractive woodland, and nearly 30 umbrageous squares within its limits. These, with its shady streets, have given it the name of the 'Forest City.' Among its works of sculptural art are monuments to Pulaski, Sergeant Jasper (both of whom fell here in battle), and General Greene; also a Confederate war monument. Its public buildings embrace the city-hall, federal building, custom-house, Telfair Academy of Arts and Sciences, Hodgson Hall, and various others. This city is the leading cotton port on the South Atlantic coast and the first naval-stores port in the world. It has also very heavy shipments of lumber, rice and phosphates. The manufactures include locomotives, cars, fertilizers, flour, cotton-seed oil, etc. Savannah was founded on the settlement of Georgia in 1733. It was taken by the British in 1778. Pop. (1910) 65,064; (1920) 83,252.

Savary (sȧ-vȧ-rē), Anne-Jean-Marie-René, Duke of Rovigo, a French general, born in 1774; died in 1833. In 1789 he entered an infantry regiment, and being appointed adjutant to Bonaparte after the battle of Marengo, he rose high in his confidence, and was entrusted with the execution of the Duke d'Enghien, finally being rewarded with the title of Duke of Rovigo. He was sent to Spain to arrange for Joseph Bonaparte being made king, and in 1810 succeeded Fouché as minister of police. When the emperor returned from Elba he was joined by Savary, who, after the defeat at Waterloo, desired to share his imprisonment in St. Helena. He was afterwards employed by the government of Louis Philippe as commander-in-chief in Algeria.

Save (sä'vė), incorrectly Sau, a river of Austria, rises in the Julian Alps, flows southeast through Carniola, separates Carniola from Styria, flows through Croatia, and after a course of about 540 miles joins the Danube at Belgrade. It is in great part navigable.

Saverne. See *Zabern.*

Savigliano (sa-vēl-yä'nō), a town of Northern Italy, province of Cuneo, situated in an angle formed by the confluence of the Maira and Grana, 31 miles south of Turin. It is well built, and has ancient walls and towers. Pop. 9895.

Savigny (sa'vin-yē), Friedrich Karl von, a German jurist, born at Frankfort-on-the-Main in 1779; died in 1861. Sent to the University of Marburg, he devoted himself to the study of jurisprudence, took his degree, and delivered lectures on his special branch of study. In 1803 he published *Das Recht des Besitzes*, which was translated into English by Sir Erskine Perry, under the title of *Savigny's Treatise on Possession.* In 1808 he became professor of law in the University of Landshut, Bavaria, and two years later filled the chair of jurisprudence in the University of Berlin, where he continued for thirty-two years. His principal works are: *Geschichte des Römischen Rechts im Mittelalter* (six vols. Heidelberg, 1826-31); *System des heutigen Römischen Rechts* (eight vols. Berlin, 1840-48), to which *Das Obligationsrecht* (two vols. Berlin, 1851-53) forms an appendix; *Vermischte Schriften* (five vols. Berlin, 1850).

Savile, or Saville, George. See *Halifax.*

Savile (sav'il), Sir Henry, an English scholar, born in Yorkshire in 1549; died in 1622. After being graduated from Brasenose College, Oxford, he removed on a fellowship to Merton College, in the same university. Having made a tour on the Continent for the purpose of perfecting himself in literature, he was on his return appointed tutor in Greek and mathematics to Queen Elizabeth. Subsequently he was appointed warden of his college and provost of Eton. He founded two professorships in geometry and astronomy at Oxford, and published *Commentaries on Roman Warfare; Rerum Anglicarum post Bedam Scriptores; Prælectiones in Elementa Euclidis;* and the writings of St. Chrysostom.

Savin (sav'in), Sav'ine, a tree or shrub of the genus *Juniperus*, the *J. Sabinea.* (See *Juniper.*) The savin of Europe resembles the red cedar (*J. virginiana*) of America, and the latter is therefore sometimes called savin.

Savings-banks. See *Bank.*

Savoie (sȧ′vwä′), a mountainous region in the southeast of France, on the frontier of Italy, forming the two departments of Savoie and Haute-Savoie. Formerly part of Sardinia.

Savoie, a department of S. E. France, bordering on Italy. It is in the region of the Alps and has rich mineral resources, agriculture and cheese interests, etc. Area 2388 sq. miles; pop. 247,900.

Savona (sa-vō′na), a seaport of Northern Italy, province of Genoa, on the west side of the Gulf of Genoa. It is charmingly situated amid lemon and orange gardens, and has a small but secure harbor defended by a fort. The industries include pottery, silk, wool, glass, paper, etc. Pop. 50,051.

Savonarola (sȧ-vō-nȧ-rō′lȧ), GIROLAMO, an Italian ecclesiastical reformer, born at Ferrara in 1452. Educated for the medical profession, he secretly entered the order of Dominicans at Bologna in 1475. In 1482 he was sent to St. Mark's convent at Florence, and began to preach there, but with little success. He retired into Lombardy, and there his increasing fame as a preacher and theologian induced Lorenzo de' Medici to invite him (1490) to return to Florence. Now his discourses attracted such crowds that the church could not contain them, the great theme of his eloquence being the corruptions in Church and State, and the general iniquity of the times. In 1491 he was elected prior of St. Mark's. He claimed to be a special messenger from God, to be the recipient of divine revelations, to see visions, and to have the gift of prophecy. He foretold the death of the pope, the king of Naples, and his patron Lorenzo. When the latter was on his death-bed (1492) Savonarola refused to grant him absolution unless under conditions which the prince refused. After the death of Lorenzo and the expulsion of his son Piero, Savonarola put himself at the head of those who demanded a more democratical form of government; and such was now his commanding influence in Florence that he organized the distracted city into a form of republic, with two councils and a governing signory. But in his zeal, not content with revolutionizing Florence, he meditated the reform of the Roman court and of the irregularities of the clergy. To this end he wrote to the Christian princes, declaring that the church was corrupt, and that it was their duty to convoke a general council. Alarmed at this, Alexander VI, who was then pope, excommunicated him in 1497, and the bull was read in the cathedral at Florence. But besides the papal and political influences which were now arrayed against Savonarola, his innovations in St. Mark's and other monasteries had excited the enmity of the monks, especially the Franciscans. In these circumstances Francesco di Puglia, a Franciscan friar, challenged Savonarola to test the truth of his divine pretensions by passing with him through the ordeal of fire. This Savonarola declined; scenes of tumult and riot arose; St. Mark's was stormed by an infuriated mob and Savonarola cast into prison. As the result of the mock trial with torture which followed in 1498, Savonarola with two of his companions, was strangled and then burned. His writings consist of some theological works, a treatise on the *Government of Florence*, and numerous sermons.

Savoy (sa′voi), one of the cultivated forms of the cabbage (*Brassica oleracea*) which has a firm head and crinkled leaves. It is good for winter use, and is best after a slight frost.

Savoy, DUCHY OF (Italian, *Savoja*; French, *Savoie*), formerly a division of the Sardinian Kingdom, now forming two of the departments of France; bounded on the north and northeast by Switzerland, on the east and southeast by Piedmont, and on the south and west by the French departments of Isère and Ain. Savoy belongs entirely to the basin of the Rhone, and is separated from Switzerland by the Lake of Geneva. The climate is in general cold, the winters are long and severe, and the summers frequently follow without an intermediate spring. The vine is cultivated with success, but the chief riches of the country are in its cattle and dairy produce. By treaty (1860) Savoy was ceded by Sardinia to France (see *Sardinia, Kingdom of*), of which it now forms two departments, Savoie, area 2388 sq. m., pop. 254,781, and Haute Savoie, area 1667 square miles, pop. 259,595. The capital of the former is Chambéry, of the latter Annecy.

Savoy, HOUSE OF, one of the oldest royal houses of Europe, now represented by the King of Italy. Humbert White Hand (Umberto Blancamano), the reputed descendant of Wittekind, the last of the Old Saxon kings, was the first of the family who took a prominent place among the princes of Northern Italy. The family dominions continued to increase, and under Amadeus II (1103-49) were raised to a county of the empire (1111), and now received the name of Savoy. Count Thomas I (1188-1233) obtained important accessions of

territory in Chambéry, Turin, Vaud, etc. Amadeus IV (1233-53) obtained the submission of the city of Turin to his rule. Amadeus VI lent his aid to the Greek emperor, John Palæologus, against the Turks and the Bulgarians, and united the lordships of Cherasco, Coni, Gex, and Valromey to his possessions. His son, Amadeus VII (1383-91), forced the Count of Provence to cede to him Nice and Vintimiglia. Amadeus VIII, grandson of the preceding (1391-1451), received the ducal title from the Emperor Sigismund in 1416, and acquired the county of Geneva, together with Bugey and Vercelli. The elder male line became extinct in 1496, and the crown devolved on the nearest collateral heirs, Philibert II (1497-1504) and his brother Charles III (1504-53). The latter aided the Emperor Charles V against Francis I of France, and was finally deprived of all his territories by the French king. But his son Philibert Emmanuel, surnamed the Iron Head (1553-80), succeeded in gaining back the greater part of the paternal domains. Charles Emmanuel I (1580-1630) was prompted to reconquer the marquisate of Saluzzo, but Henry IV of France invaded Savoy and Piedmont, and compelled the duke to give up Bugey, Valromey, and Gex. His son, Victor Amadeus I, regained these possessions, and added to them Montferrat, Alba, and some other places. Victor Amadeus II (1675-1730), grandson of the first of that name, at the beginning of the war of the Spanish Succession sided with France, but afterwards transferred his services to Austria. By the Treaty of Utrecht (1713) he received a part of the Duchy of Milan, along with the island of Sicily, which conferred upon him the title of king; but in 1720 he was compelled to give up Sicily to Austria in exchange for Sardinia, which, along with Savoy, Piedmont, and his other dominions, became the Kingdom of Sardinia. See *Sardinia, Kingdom of.*

Savoy, The, a district of London, between the Strand and the Thames Embankment, site of the Savoy Palace, built by Peter of Savoy, uncle of Eleanor, queen of Henry III, in 1245. It was burned by Wat Tyler in 1381, but restored as the Hospital of St. John by Henry VII in 1505. The hospital was dissolved in 1702, and the buildings removed in 1817-19. The *Chapel of the Savoy,* which at one time enjoyed the privilege of sanctuary, was greatly injured by fire in 1864, and was restored at the expense of Queen Victoria. It is one of the chapels-royal (being connected with the duchy of Lancaster), but at the present time is used as a district church.

Savoy Conference, an ecclesiastical conference held in 1661 at the Savoy Palace (see above) between Episcopalian and Presbyterian divines. The proposal made by the Presbyterians was, that the conference should adopt Bishop Ussher's scheme of presbyteries, synods and assemblies as the basis of negotiations, but to this it was replied that the commission was not empowered to deal with church government. The two parties finally separated at the end of four months without coming to a single resolution. The government passed in the following year the famous act of uniformity, the stringent clauses of which drove about 2000 clergymen from the Anglican Church.

Savu (sä-vö′), Savou, or Savoe, an island of the Malay Archipelago southwest of Timor; area, 237 square miles. It yields millet, maize, sugar-cane, cotton, tobacco, etc., and its Malayan inhabitants are subject to the Dutch government of Timor. Pop. about 16,000.

Sawantwari (så-want-wä′rē), a native state in the Bombay Presidency, situated about 200 miles south of Bombay, bounded north and west by the British district of Ratnagiri, and on the south by the Portuguese territory of Goa; area, 900 square miles. Pop. (mostly Hindu), 217,732.

Saw-fish, a fish (*Pristis antiquorum*) nearly related on the one hand to the sharks, and on the other to the rays. It attains a length of from 12 to 18 feet, has a long beak or snout, with spines projecting like teeth on both edges, armed with which it is very destructive to shoals of small fishes, and is said to attack and inflict severe and even mortal injuries on the large cetaceans or whales.

Saw-flies, a group of insects belonging to the order Hymenoptera, and distinguished by the peculiar conformation of the ovipositor of the females, which is composed of two broad plates, with serrated or toothed edges, by means of which they incise the stems and leaves of plants, and deposit their eggs in the slits thus formed. The turnip-fly (*Athalia centifolia*) and the gooseberry-fly (*Nematus grossulariæ*) are examples.

Saw-fly.
a, Turnip saw-fly (*Athalia centifolia*), *b*, Ovipositor of saw-fly magnified to show the saw.

Saws, are instruments with a dentated or toothed edge employed to cut wood, stone, ivory, or other solid substance, and are either straight or circular. In form and size they vary from the minute surgical or dental tool to the large instrument used in saw-mills. The *cross-cut saw*, for cutting logs transversely, is a large straight saw wrought by two persons, one at each end. The *ripping-saw*, *half-ripper*, *hand-saw*, and *panel-saw* are saws for the use of one person, the blades tapering in length from the handle. *Tenon-saws*, *sash-saws*, *dove-tail saws*, etc., are saws made of very thin blades of steel stiffened with stout pieces of brass, iron, or steel fixed on their back edges. They are used for forming the shoulders of tenons, dovetail joints, etc., and for many other purposes for which a neat clean cut is required. *Compass* and *key-hole saws* are long narrow saws, tapering from about 1 inch to ⅛ inch in width, and used for making curved cuts. Machine saws are comprehended under three different classes — circular, reciprocating, and band-saws. The *circular saw* is a disk of steel with saw teeth upon its periphery. It is made to revolve with great rapidity and force, while the log is pushed forward against it by means of a traveling platform. The *reciprocating saw* works like a two-handled hand-saw, being driven upwards and downwards and the wood carried forward against its teeth. The *band-saw* or *ribbon-saw* consists of a thin endless saw placed like a belt over two wheels, and strained on them. The ribbon passes down through a flat sawing-table, upon which the material to be cut is laid. Saws for cutting stone are without teeth. The sawing of timber is an important industry in some countries, especially the United States and Canada, where immense quantities of lumber are produced. Water-power is often employed to drive the machinery of the saw-mills, but steam is equally common.

Saxe (såks), Hermann Maurice, Comte de, Marshal of France, natural son of Augustus II, king of Poland, by Aurora, countess of Königsmark, born at Dresden in 1696; died in 1750. At the age of twelve he joined the allied army under the Duke of Marlborough and the Prince Eugene, and was present at the sieges of Lille and Tournay. After the Treaties of Utrecht and Passarowitz he withdrew to France, and at Paris made himself intimately acquainted with professional tactics. On the death of his father he declined the command of the Saxon army, offered him by his brother Augustus III, and joined the French, with whom he distinguished himself at Dettingen and Philipsburg, and in 1744 was rewarded with the staff of a marshal of France. He was employed in the war that followed the death of the Emperor Charles VI, and in 1745 gained the famous battle of Fontenoy. In 1747 he was victorious at Laufeldt, and in the following year took Maestricht, soon after which the Peace of Aix-la-Chapelle was concluded. He wrote a treatise entitled *Mes Rêveries*, on the art of war.

Saxe, John Godfrey, humorist, was born in Franklin Co., Vermont, June 2, 1816. He studied law, but ultimately took to journalism and literature. His poems, many of which are of a humorous character, have been very popular in America. They include *Progress, a Satirical Poem* (1846); *Humorous and Satirical Poems* (1850); *Money King* (1859); *Flying Dutchman* (1862); *Clever Stories of Many Nations* (1865); *The Masquerade* (1866); *Fables and Legends* (1872); and *Leisure Day Rhymes* (1875). He died March 31, 1887.

Saxe-Altenburg (saks-al'tĕn-burg; German, *Sachsen-Altenburg;* zȧk' sĕn-ȧl' tĕn-bu*r*h), an independent duchy in Thuringia, forming one of the states in the German Empire, is divided into two nearly equal portions by a part of Reuss, and is bounded on the S. W. by the Grand-duchy of Saxe-Weimar-Eisenach, on the N. by Prussia, and on the E. by Saxony; area, 511 square miles. The eastern or Altenburg division is very fertile, while the western or Saal-Eisenburg portion is hilly and wooded. The duchy is represented by one vote in the Bundesrath and one vote in the Reichstag of the German Empire. The capital is Altenburg. Pop. 206,508.

Saxe-Coburg-Gotha (saks-ko'-burg-gō'ta; German, *Sachsen-Koburg-Gotha*), a duchy of Central Germany, one of the states of the German Empire, comprising the province of Gotha, lying between Prussia, Schwarzburg, Meiningen, and Weimar; and the province of Coburg, lying between Meiningen and Bavaria; Coburg 218 square miles, and Gotha 542 square miles. The south of Gotha and north of Coburg are both mountainous. Both divisions are fertile; the hills are covered with wood, and in Gotha coal and other minerals are found. The chief occupations of the inhabitants, particularly in Coburg, are cattle-rearing and agriculture. In Gotha there are manufactures of linen, leather, metal-wares, etc. The government is a constitutional

monarchy, and each province has its own elective assembly, while the duchy sends one member to the Bundesrath and two to the Reichstag of the German Empire. For affairs common to both divisions the assemblies meet conjointly at Coburg and at Gotha alternately, the two chief towns of the duchy. The ducal house and the greater part of the population profess the Lutheran faith. Pop. 242,532.

Saxe-Meiningen (saks-mī'ning-en; German, *Sachsen-Meiningen*), a duchy of Central Germany, and one of the States of the German Empire, consisting of a main body, and several minor isolated portions. Area, 955 square miles. The greater part of the surface is hilly, and the principal crops are oats, buckwheat, potatoes, turnips, hemp; and the pastures rear considerable numbers of cattle, sheep, and horses. The minerals include iron and copper, worked to a small extent, and the manufactures are chiefly ironware, porcelain, glass, etc. The government is a hereditary and constitutional monarchy, and the great majority of the inhabitants are Lutherans. The duchy sends one member to the Bundesrath and two to the Reichstag of the German Empire. The capital is Meiningen. Pop. 268,916.

Saxe-Weimar, or SAXE-WEIMAR-EISENACH (saks-wī'mår; German, *Sachsen-Weimar-Eisenach;* zåk'sėn-vī-mår-ī'zn-å*h*), a grand-duchy of Central Germany, one of the States of the German Empire, and consisting of three larger portions, Weimar, Neustadt, and Eisenach, and twelve smaller parcels. Area of the whole, 1421 square miles. The forests are very extensive, and form the principal wealth of the grand-duchy. The minerals are unimportant. In Eisenach woolen, cotton, and linen tissues, ribbons, carpets, etc., are made. The chief town is Weimar, and there is a university of considerable repute at Jena. The government is constitutional, the legislative power being vested in a house of parliament, consisting of one chamber of thirty-one members. Saxe-Weimar sends one member to the Bundesrath and three to the Reichstag of the German Empire. Pop. 388,095.

Bass Sax-horn.

Sax-horn (after M. Sax, of Paris, the inventor), a name of several brass wind-instruments with a wide mouthpiece and three, four, or five pistons, much employed in military bands. These horns comprise the piccolo cornet or high small sax-horn, the soprano, the alto, the tenor, baritone, bass, and double-bass.

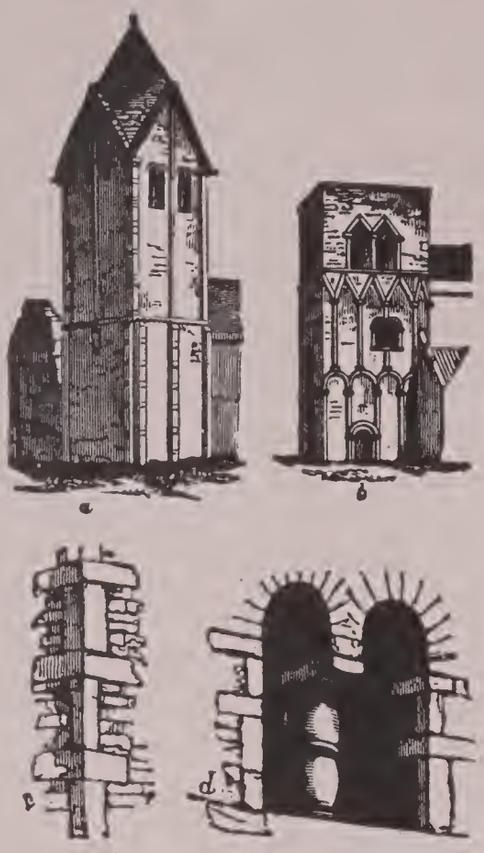
Saxicava (sak-si-kā-va), a genus of marine lamellibranchiate molluscs, remarkable for excavating burrows in rock to serve as their habitations.

Saxifrage (sak'si-frāj), a popular name of various plants, the saxifrages proper belonging to the genus *Saxifrăga*, of the nat. order Saxifragaceæ. The species are mostly inhabitants of alpine and subalpine regions of the colder and temperate parts of the northern zone. Most of them are true rock plants, with tufted foliage and panicles of white, yellow, or red flowers; and many are well known as ornamental plants in our gardens, as *S. umbrōsa*, London pride or none-so-pretty; *S. granulāta*, white or granulated meadow saxifrage; *S. hypnoides*, mossy saxifrage or ladies' cushion; *S. crassifolia*, or thick-leaved saxifrage; *S. sarmentōsa*, or Chinese saxifrage. The genus is a large one, containing upwards of 150 species, of which at least fifty are natives of North America.

Saxo Grammaticus (that is, Saxo the Grammarian, or the Learned), the most celebrated of the old Danish historians, who flourished in the twelfth century. He is supposed to have been a native of Denmark, of which kingdom and its dependencies he compiled (in Latin) an elaborate history down to 1186. Saxo was a priest in the cathedral of Roeskilde, and died about 1208.

Saxon Architecture, the earliest stage of native English architecture, its period being from the conversion of England to Christianity till the Conquest or near it, when Norman architecture began to prevail (seventh to eleventh century). The few relics left us of this style exhibit its general characteristics as having been rude solidity and strength. The walls are of rough masonry, very thick, without buttresses, and sometimes of herring-bone work; the towers and pillars thick in proportion to height, the former being sometimes not more than three diameters high; the quoins or angle masonry are of hewn stones set alternately on end and horizontally; the arches of doorways and windows are rounded, or sometimes these openings have triangular heads, their jambs of long and short work carrying either rudely carved imposts or

capitals with square abaci. Sometimes heavy moldings run round the arches, and when two or more arches are conjoined in an arcade these are on heavy low shafts formed like balusters. Win-



Saxon Architecture.

a, Tower of Somting Church, Essex. *b*, Tower of Barton-on-Humber Church, Lincolnshire. *c*, Long and short work. *d*, window with a baluster.

dow openings in the walls splay from both the interior and the exterior, the position of the windows being in the middle of the thickness of the wall.

Saxons (saks'uns; German, *Sachsen;* Latin, *Saxŏnes*), a Teutonic race whose name is generally derived from the Old German word *sahs* (a knife or short sword). They are first mentioned by Ptolemy, who speaks of them as inhabiting a district bounded by the Eider, the Elbe, and the Trave. In the third century of the Christian era they were a numerous, warlike, and piratical people. In the fifth century considerable hordes of them crossed from the Continent and laid the foundations of the Saxon kingdoms in Britain — Essex or East Saxons, Sussex or South Saxons, etc. (See *England* and *Anglo-Saxons.*) Those who remained in Germany (Old Saxons) occupied a great extent of country, of vague and varying limits, which bore the general name of Saxony. Charlemagne waged a thirty years' war against the Saxons; and Wittikind, their national hero, with many of his countrymen, submitted to his arms, and embraced Christianity. See *Saxony, Republic of.*

Saxon Switzerland, a name which has been given to part of the State of Saxony, on the Elbe, southeast of Dresden and bordering on Bohemia. It consists of a group of mountains of sandstone, with valleys and streams of the most picturesque character, in which isolated masses of sandstone, large and small, occur in very fantastic shapes. It is about 24 miles long, and equally wide.

Saxony (saks'un-i), Republic of German, *Sachsen*), a free state of Central Germany; bounded on the northwest, north, and east by Prussia, southeast and south by Bohemia, southwest by Bavaria, and west by Reuss, Saxe-Weimar, and Saxe-Altenburg; greatest length, 135 miles; greatest breadth, 75 miles; area, 5786 square miles; pop. 4,797,700. For administrative purposes it is divided into the four districts of Dresden, Leipzig, Zwickau, and Bautzen or Budissin.

General Features.— With the exception of a very small portion of the east, which sends its waters to the Baltic, Saxony belongs to the basin of the Elbe, which traverses it in a northwesterly direction for about 70 miles, the most important of its tributaries being the Mulde and the Elster. The surface, though very much broken, may be regarded as an inclined plane, which commences in the south, in the Erzgebirge chain, and slopes towards the north. In the more elevated districts the scenery is wild, while on either side of the Elbe, from the Bohemian frontier to Pirna, is a remarkable tract, covered with fantastic sandstone formations, which has received the name of the Saxon Switzerland. On the Prussian frontiers, where the district subsides to its lowest point, the height above the sea is only 250 feet. The loftiest summits are generally composed of granite and gneiss, and are rich in mineral products. The Erzgebirge is continued by the Riesengebirge, a branch of which, under the name of the Lausitzer-gebirge, or Mountains of Lusatia, covers a considerable portion of the east of Saxony. The climate in the loftier mountain districts is very cold, but with this exception it is milder than that of most countries of Europe under the same latitude.

Productions, Industries.— The most important crops are rye, oats, barley, wheat, potatoes; and orchard-fruits, particularly apples, pears, and plums, an

very abundant. Considerable attention is paid to the culture of the vine. Large numbers of horned cattle are exported. The wool of Saxony has long been celebrated for its excellence. Swine and horses are of a superior breed. The minerals are of great importance, and include silver, lead, tin, iron, cobalt, nickel, bismuth, and arsenic. Numerous seams, both of lignite and coal, are found in various districts, and are worked to a considerable extent. The quarries furnish in abundance granite, porphyry, basalt, marble, serpentine, and sandstone. Several mineral springs of reputation exist. Saxony is an important manufacturing country. The principal manufactures are cotton and woolen goods, linen, lace, ribbons, and straw-plaiting. Other industries are earthenware, Dresden ware, leather, chemicals, etc., and the printing establishments of Leipzig are well known. The railroads of Saxony are connected with the great trunk lines which traverse Central Europe.

Administration, etc.—Prior to 1918 the government was a constitutional monarchy (forming part of the German Empire), in which the executive power was lodged in the crown, and the legislative power in the crown and two chambers. Following the defeat of Germany in the European war (q. v.) and the abdication of William II (in 1918) Saxony changed from a monarchy to a republic, within the German Confederation. A provisional constitution was agreed to in February, 1919, by the Saxon People's Chamber, which was elected in the preceding month. Justice is administered by three classes of courts, namely, courts of primary, secondary, and tertiary resort or instance. In religion universal toleration is guaranteed; but the religious body recognized by the state is the Lutherans. At the head of the educational establishments of the kingdom is the University of Leipzig, and there are gymnasia in the principal towns. The army was formerly raised by conscription, but this was prohibited by the Treaty of Versailles (see *Treaty of Peace with Germany*). Of the states of the empire it is the fifth in size and the third in population. The chief towns are Dresden (the capital), Leipzig, Chemnitz, Zwickau, Plauen, Freiberg, Meissen, Zittau, and Bautzen.

History.— The present ruling family in Saxony claims descent from Wittikind, the national hero who was conquered by Charlemagne and embraced Christianity. The territory became a duchy about 880, and in the tenth century Duke Henry was elected German emperor. In 1127 the duchy passed to the Bavarian branch of the Guelf family, and after several changes Frederick the Warrior, margrave of Meissen and landgrave of Thuringia, became (1423) Elector of Saxony. His grandsons, Ernest and Albert, in 1485 divided the family possessions, founding the Ernestine and Albertine lines respectively, the former retaining the electoral dignity. Ernest was succeeded by his sons Frederick III (1486-1525) and John (1525-1532), but in 1548 the elector of the Ernestine line was put under the ban of the empire, and the electorate transferred to Maurice, who represented the Albertine line which now occupies the throne. Maurice was succeeded by his brother Augustus (1553-86), who made important additions to the Saxon territories by purchase and otherwise. His son, Christian I, died in 1691, leaving his crown to his son. Christian II. Christian's brother and successor, John George I (1611-56), joined Gustavus Adolphus in the Thirty Years' war, and the Saxon forces took part at Breitenfeld and at Lützen. Frederick Augustus I (1694-1733) embraced the Catholic religion (1697) to obtain the crown of Poland. Frederick Augustus II also obtained the Polish crown (as Augustus III) after a war with France and joined with Austria in the Seven Years' war. Frederick Augustus III (1763-1827) reluctantly took part against France when war was declared by the imperial diet in 1793, but after the battle of Jena the elector and his army fought side by side with the French. Napoleon conferred upon him the title of king, and large additions were made to the Saxon territory in 1807 and 1809. In 1813 Saxony was the scene of Napoleon's struggle with the allies, and the battles of Lützen, Bautzen, Dresden, and Leipzig were followed by the Congress of Vienna (1814), when a large part of the dominions then under the Saxon monarch was ceded to Prussia. A period of great progress followed, interrupted somewhat at the revolutionary period of 1848-49. In the Austro-Prussian war of 1866 Saxony took part with Austria, and was occupied by the Prussian troops. Prussia desired to incorporate the kingdom, but Austria, supported by France, opposed this arrangement, and Saxony was admitted into the North German Confederation instead; becoming a member of the German Empire in 1871. On Nov. 9, 1918, Saxony became a republic within the Federation.

Saxony, PRUSSIAN, a province of the state of Prussia, of irregular shape, and with isolated districts,

almost in the center of Germany, to the north of the state of Saxony; area, 9729 square miles. Originally a part of Saxony, it was given to Prussia by the Congress of Vienna (1814). The northern and larger portion belongs to the North German plain; the southern and southwestern is elevated or hilly, partly belonging to the Harz Mountain system. The capital of the province is Magdeburg; other towns are Halle (with a university), Erfurt, Halberstadt. Pop. 2,979,221.

Saxophone, a brass wind instrument, so named from Adolph Sax. It consists of a conical brass tube curved forward and upward, containing about twenty lateral holes covered by keys. It is played by a mouthpiece and reed as is the clarinet. The tone is rich and mellow.

Say (sā), Jean Baptiste, a political economist, born at Lyons, France, in 1767; died in 1832. He was destined by his father for a commercial career, and passed a part of his youth in England. On his return to France he was for some time secretary to Clavière, the minister of finance, and from 1794 to 1800 conducted a journal called the *Décade*. In 1799 he was a member of the tribunate, but being removed by Napoleon devoted himself to industrial pursuits. In 1819 he was appointed professor of industrial economy at the Conservatoire des Arts et Métiers, and in 1831 was nominated to the chair of political economy at the Collége de France. His chief works are his *Traité d'Économie politique*, and his *Cours complet d'Économie politique pratique*.

Say, Jean Baptiste Léon, a French statesman and economist, grandson of the above, was born at Paris, in 1826. He was returned to the National Assembly in 1871, and in the following year became finance minister in the government of M. Theirs. He occupied this position in successive ministries; was appointed ambassador to London in 1880, and soon afterwards was elected president of the senate. His chief economic works are *Histoire de la Caisse d'Escompte; La Ville de Paris et le Crédit Foncier;* and *Les Obligations Populaires*. He also contributed to the *Journal des débats*. He died April 21, 1896.

Say, Thomas, an American naturalist, born in Philadelphia, Pennsylvania, in 1787. He was one of the founders of the Academy of Natural Sciences in Philadelphia in 1812; participated in a scientific exploration of the coasts and adjacent islands of Georgia and Florida in 1818; was chief geologist of an expedition to the Rocky Mountains in 1819-1820. He is supposed to have discovered more new species of insects than any naturalist prior to his time. He died in 1834.

Sayce (sās), Archibald Henry, comparative philologist and orientalist, born at Shirehampton, England, September 25, 1846. He was educated at Bath and Oxford, where he became a fellow and tutor at Queen's College. In 1878 he was appointed deputy professor of comparative philology under Max Müller. He was a member of the Old Testament Revision Company, and was Hibbert lecturer (1887). He is the author of many works on philology and on oriental languages, including *Principles of Comparative Philology; Introduction to the Science of Language; Ancient Empires of the East; Assyria, its Princes, Priests, and People; Assyrian Grammar; Lectures on the Origin of Religion, The Hittites, The Higher Criticism and the Monuments*, etc.

Sayre (sā'er, or sār), a borough of Bradford Co., Pennsylvania, on the Susquehanna River, 19 miles s. w. of Owego. It has railroad shops, car-wheel works, metal-work industries, etc. Pop. (1920) 8078.

Scab, a skin disease in sheep, analogous to itch in man and mange in horses and dogs, usually propagated by contagion, and caused by the presence of minute acari, which burrow under the skin. Various medicines have been recommended, such as lard or palm-oil, 2 lbs.; oil of tar, ½ lb.; sulphur, 1 lb., mixed together and rubbed on the diseased spots.

Scabbard-fish (the *Lepidopus caudatus*), a beautiful fish found in the Mediterranean and Eastern Atlantic, so called because in shape it bears some resemblance to the sheath of a sword. It is of a bright silvery whiteness, with a single dorsal fin running along the back.

Scabious (skā'bi-us; *Scabiōsa*), an extensive genus of annual and perennial herbs, belonging to the nat. order Dipsaceæ. They are annual or perennial herbs, with entire or divided leaves and heads of blue, pink, white or yellowish flowers. *S. succīsa*, devil's bit, is a common plant. It possesses great astringency but no important medicinal virtues, although it was formerly supposed to be of great efficacy in all scaly eruptions, hence the name.

Scad, or Horse-mackerel (*Trachūrus trachūrus*), a genus of teleostean fishes included in the family Scomberidæ or mackerels, found in the North Atlantic. It appears in large shoals, and the flesh,

although coarse, is esteemed and eaten salted during the winter months.

Scævola. See *Mucius Scævola.*

Scafell (skä'fel), or SCAW FELL, a mountain of England, in the south of the county of Cumberland, near the borders of Westmoreland, consists of two principal summits, separated from each other by a deep chasm. Of the two peaks the higher is 3229 feet, the other 3092 feet in height.

Scagliola (skål-yi-ō'lå), a composition, imitative of marble, used for enriching columns and internal walls of buildings. It is composed of gypsum, or sulphate of lime, calcined and reduced to a fine powder, with the addition of water, by which a fine paste is made. While soft it is bestudded with splinters of spar, marble, granite, bits of concrete, colored gypsum, or veins of clay, in a semifluid state. It is smoothed with fine iron tools when soft, and when it becomes hard receives a high polish like marble.

Scala-Nova (skä'la-nō'va; Turkish, KUSHADASSI), a seaport town in Asiatic Turkey, at the head of the gulf of same name, 40 miles south of Smyrna. The ruins of Ephesus are in the neighborhood. Pop. about 7000.

Scalaria (ska-lâr'i-a), a genus of marine, turreted, gasteropodous mollusca, with raised ribs or ridges on their shells. They are found in sandy mud, at depths varying from 7 to 13 fathoms, and are commonly called wentle-traps.

Scald-fish, a marine flat-fish, *Rhombus Arnoglossus*, allied to the turbot, sole, and flounder. It is not uncommon on the British coasts.

Scald-head, a fungous parasitic disease of the scalp. See *Favus.*

Scalds. See *Burns and Scalds.*

Scalds, or SKALDS, were the poets and historians of the Scandinavian race. They sang the praises of the gods, and celebrated the exploits of the national heroes. A list of 230 of the most distinguished is still preserved in the Icelandic records.

Scale (skāl), a mathematical instrument consisting of a slip of wood, ivory, or metal, with one or more sets of spaces graduated and numbered on its surface for measuring or laying off distances, etc.

Scale, in music, a succession of notes arranged in the order of pitch, and comprising those sounds which may occur in a piece of music written in a given key. In its simplest form the scale consists of seven steps or degrees counted upward in a regular order from a root or prime (the tonic or key-note), to which series the eighth is added to form the octave. It has been the practice among musicians to consider the scale having C for its key-note as the natural, model, or normal scale. The diatonic scale ascends by five steps (tones) and two half-steps (semitones), taking for the names of the notes the syllables do. re, mi, fa, sol, la, si, do; the two semitones occur between E and F (mi and fa) and B and C (si and do). When the scale is graduated all the way by a series of twelve half-steps or semitones it is called the chromatic scale. A scale is said to be major when the interval between the key-note and the third above it, as from C to E, consists of two tones; it is called minor when the interval between the key-note and its third, as from A to C, consists of a tone and a half. See *Music.*

Scale-fern, a popular name for a fern of the genus *Ceterach* (*C. officinārum*), so-named from the imbricated tawny scales at the back of the fronds. To this plant was formerly attributed a marvelous influence over the liver and spleen. It is a British species, and is said to be used as a bait for fish on the coast of Wales.

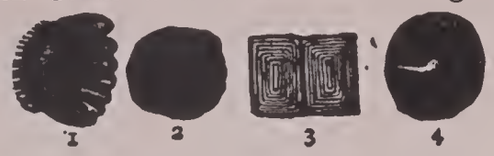
Scale-insect, a name given to various insects of the Coccus family injurious to plants. See *Coccus.*

Scale-moss, a popular name given to the Jungermannias, plants resembling moss, and belonging to the order Hepaticæ. They grow on the trunks of trees, in damp earth, and in similar places, and are so-called from the small scale-like leaves.

Scalene (ska-lēn'), in mathematics, a term applied to a triangle of which the three sides are unequal. A cone or cylinder is also said to be scalene when its axis is inclined to its base, but in this case the term *oblique* is more frequently used.

Scales, the imbricated plates on the exterior of certain animals, as the pangolins or scaly ant-eaters, serpents and other reptiles, and especially fishes. The scales of the latter are developed beneath the true epiderm, and consist of alternate layers of membrane, of horny matter, and occasionally of phosphate of lime. Fishes were classed by Agassiz, in accordance with the structure of their scales, into Ctenoid, Ganoid, Cycloid, and Placoid, the general appearance and character of which

are indicated in the accompanying figures. (See also the separate terms.) The term scale is applied also in botany to a small rudimentary or metamorphosed leaf, scale-like in form and often in arrangement,



Scales of Fishes.

1, Ctenoid Scale of the Perch. 2. Cycloid Scale of the Carp. 3, Ganoid Scales of Dipterus. 4, Placoid Scale of Ray.

constituting the covering of the leaf-buds of the deciduous trees in cold climates, the involucrum of the Compositæ, the bracts of catkins, etc.

Scale-tail. See *Anomalure.*

Scaliger (skal'i-jėr), JOSEPH JUSTUS, son of Julius Cæsar Scaliger, born at Agen in France, in 1540; died in 1609. His training as a scholar was largely due to his father, after whose death he went, at the age of nineteen, to Paris, where he studied Greek, Hebrew, Syriac, Persian, and most of the modern European languages. For some time he led an unsettled life, visiting Italy and England in his search for manuscripts. Having become a Protestant, he retired from France after the massacre of St. Bartholomew, and was made professor in the Academy at Geneva, but returned to France in 1574, and lived there for the succeeding twenty years. In 1593 he was appointed to the chair of polite literature in the University of Leyden, and remained there until his death. Of his numerous works, the treatise *De Emendatione Temporum*, is one of the most important. In this work he gave the first complete and scientific chronological system. His annotations to Theocritus, Nonnus, Catullus, Tibullus, Propertius, Seneca (tragedies), Varro, Ausonius, Festus, are characterized by an excessive subtlety and over-free treatment of the text.— SCALIGER, JULIUS CÆSAR, father of the above, was born in 1484, and resided in Venice or Padua till his forty-second year, occupied with study and the practice of medicine. His writings gave him a high rank among the scholars of his age, although the boldness of some of his works rendered his faith suspected. He died in 1558. Both father and son gave rise to much ridicule on account of their vanity and irritability. The work of neither is commensurate with his fame.

Scallop. See *Pecten.*

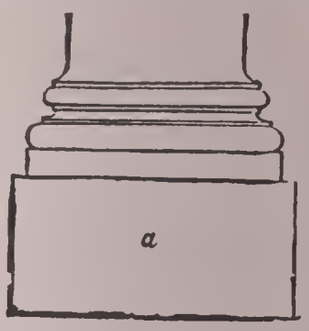
Scalp, the outer covering of the skull, composed of skin and of the expanded tendon of the occipito-frontal muscle, and of intermediate cellular tissue and blood-vessels. Hence the skin of the head or a part of it, with the hair belonging to it, torn or cut off by the American Indians as a mark of victory over an enemy.

Scalping, the act, peculiar to North American Indian warfare, of partly cutting, partly tearing off a piece of the skin of the head, with the hair attached; whether the victim was alive or dead at the time does not affect the operation. The Indians, with whom scalps were the trophies of victory, always left a long lock or tuft on the scalp as a challenge. The whites at times encouraged the practice by offering bounties for scalps, especially during the French and Indian war. In 1755 Massachusetts offered £40 for every scalp of a male Indian over 12 years of age, and £20 for scalps of women and children. The French offered bounties for British scalps, and in the Revolution the British in the West for American scalps.

Scaly Ant-Eater. See *Pangolin.*

Scamander (ska-man'dėr), a small stream in the Troad, in the northwest of Asia Minor, associated with the little river Simois in the story of the Trojan war.

Scamillus (ska-mil'-us), in ancient architecture, a sort of second plinth or block under a column, statue, etc., to raise it, but not, like a pedestal, ornamented with any kind of molding.



a, Scamillus.

Scammony (skam'u-ni), a plant of the genus *Convolvulus* the *C. Scammonia*, which grows abundantly in Syria and Asia Minor. It resembles the common bindweed (*C. arvensis*), but is larger, and has a stout tap-root, from which the drug scammony is extracted. This is the inspissated sap of the root, of a blackish gray color, a nauseous smell, and a bitter and acrid taste. It is used in medicine as a drastic purge, and usually administered in combination with other purgatives in doses of three or four grains.— *French* or *Montpellier scammony* is a substance made in the south of France from the expressed juice of *Cynanchum monspeliacum* (order Asclepiadaceæ), mixed with

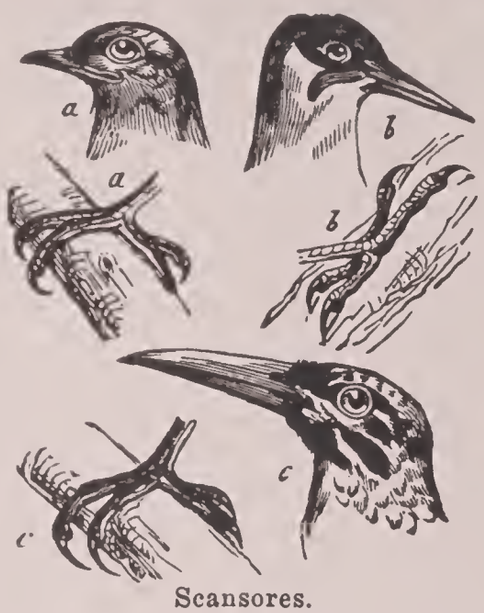
different resins and other purgative substances.

Scanderbeg (skan'dêr-beg; that is, *Alexander Bey*), prince or Albania, whose proper name was George Castriota, son of John, prince of that country, was born about the year 1404; died in 1467. As a boy he was sent as a hostage and educated at the Turkish court. At the age of eighteen he was placed at the head of a body of troops, but hearing of the death of his father, Scanderbeg renounced Mohammedanism and raised the standard of insurrection in Albania. He repeatedly defeated the Ottoman forces, and Mohammed II found it necessary (1461) to accept terms of peace. After his death Albania again fell under Turkish dominion.

Scandinavia (skan-di-nā'vi-a), the ancient name of the region now comprehending the three northern kingdoms, Denmark, Sweden and Norway, also Sweden and Norway alone, and still not uncommonly used. These countries were inhabited in the earliest times by people of the Teutonic stock, and B.C. 100 the natives of Jutland and Schleswig became formidable to the Romans under the name of *Cimbri*. But it was chiefly in the ninth century that they made their power felt in the western and southern parts of Europe, where hordes of Northmen or Vikings, as they were often called, made repeated raids in their galleys on the coasts of England, Scotland, Ireland, Holland, Germany, France, Spain, and Italy, where they plundered, destroyed, and sometimes founded new kingdoms. (See *Northmen.*) The Old Norse or Scandinavian literature, so far as extant, is of considerable value, having preserved to us not only the old versification peculiar to all nations of Teutonic origin, but also the mythology, history, and laws of the pagan period of these northern countries. Among the most valuable remains are the *Edda* and the *Sagas* (which see). For the ancient mythology see *Northern Mythology.*

Scandix (skan'diks), a small genus of plants, nat. order Umbelliferæ. It is composed of annual herbs with striated stems, bipinnate leaves, the leaflets divided into linear lobes, and small umbels of white flowers which are succeeded by slender long-beaked fruits. A common species is *S. Pecten-Veneris* (needle chervil, shepherd's needle or Venus's comb).

Scansores (skan-sō'rēz), an order of birds, popularly known as climbing birds, having the feet provided with four toes, of which two are turned backwards and two forwards. Of the two toes which are directed backwards one is the hallux or proper hind-toe, the other is the outermost of the normal three anterior toes. This conformation of the foot enables the scansores to



Scansores.

a, Head and foot of Cuckoo. *b*, Do. of Green Woodpecker. *c*, Do. of Great Jacamar.

climb with unusual facility. Their food consists of insects and fruit; their nests are usually made in the hollows of old trees. The most important families are the cuckoos (Cuculidæ), the woodpeckers and wry-necks (Picidæ), the parrots (Psittacidæ), the toucans (Ramphastidæ), the trogons (Trogonidæ), the barbets (Bucconidæ), and the plantain-eaters (Musophagidæ). Not all of this order are actually climbers, and there are climbing birds which do not belong to this order.

Scansores.

a, Skull of Parrot (*Psittacus erythacus*). *b*, Foot of the same: *a*, Hallux; *b*, Index; *c*, Middle toe; *d*, Outer or ring toe. (After Blanchard.)

Scape (skāp), in botany, an unbranched stem, or rather peduncle, rising from the foot and bearing the fructification without leaves, as in the

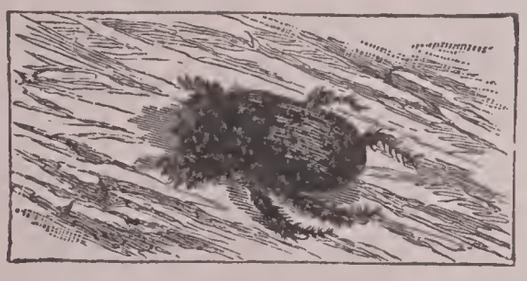
narcissus and hyacinth.— In architecture, the spring of a column; the part where a column springs from its base, usually molded into a concave sweep or cavetto.

Scape-goat, in the Jewish ritual, a goat which was brought to the door of the tabernacle, where the high-priest laid his hands upon him, confessing the sins of the people, and putting them on the head of the goat, after which the goat was sent into the wilderness, bearing the iniquities of the people. Lev. xvi.

Scapula (skap'ū-la), or SHOULDER-BLADE, the bone which in most mammalia forms the chief bone of the shoulder girdle, and which chiefly supports the upper limb on the trunk or axial skeleton. In man the scapula exists as a flattened bone of triangular shape, which lies on each side of the body, on the back, and towards the upper and outer border of the chest or thorax. The internal surface of the scapula is concave, and is applied against the ribs. The outer or dorsal surface is divided into two portions by a strong ridge which runs obliquely across the bone.

Scapulary (skap'ū-la-ri), a kind of garment or portion of dress, consisting of two bands of woolen stuff — one going down the breast and the other on the back, over the shoulders — worn by a *religicux*. The original scapulary was first introduced by St. Benedict, in lieu of a heavy cowl for the shoulders, designed to carry loads.

Scarabæus (skar-a-bē'us), an extensive genus of coleopterous insects placed by Linnæus at the head of the insect tribes, and answering to the section Lamellicornes of Latreille. They are sometimes called *dung-beetles*, from their habit of inclosing their eggs in pellets of dung, which are placed in



Scarabæus sacer, or Sacred Beetle.

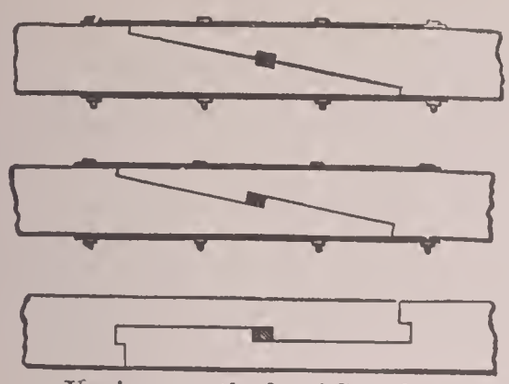
holes excavated for their reception. The *S. sacer*, or sacred beetle of the Egyptians, was regarded with great veneration; and figures of it, plain or inscribed with characters, were habitually worn by the ancient Egyptians as an amulet. Large numbers of carved *scarabæi* or scarabs, made of hard stone or gems, are still found in Egypt, often inscribed with hieroglyphics. Some of the carved scarabs are three or four feet long. The beetle itself was also embalmed.

Scaramouch (skar'a-mouch), a personage in Italian comedy, imported originally from Spain, whose character was compounded of traits of vaunting and poltroonery. His costume was black from top to toe, he wore a black *toque* (kind of square-topped cap), a black mantle, and had on his face a mask with openings. In France the scaramouch was used for a greater variety of parts.

Scarborough (skä'brō, or skär'-bur-ō), a borough and seaport of England, county of York (North Riding), is beautifully situated on two open sandy bays separated by a bold promontory of rock 300 feet high, on the North Sea, 39 miles northeast of York. The main part of the town is south of this promontory and a deep valley divides it, and is bridged over from St. Nicholas Cliff to the South Cliff. Scarborough has a town-hall, market-hall, custom-house, assembly-rooms, public rooms, a theater, some large hotels, several hospitals, a fine aquarium, a museum, spa saloon, etc. It is much frequented for sea-bathing and for its mineral waters, which contain carbonate and sulphate of lime, magnesia, and oxide of iron. There is a fine sea-wall, forming an agreeable promenade, also a promenade pier on the north side of the town. Scarborough harbor is much used by the fishing-fleets, and though confined at the entrance is easy of access, and safe and commodious. The castle, which stands on the dividing promontory, was erected about 1136, and is a conspicuous object to the seaward. The cliff on which it stands is exposed to a steady and rapid denudation by the sea. Scarborough carries on a limited foreign trade, principally with France, Holland, and the Baltic. Shipbuilding, rope and sail-cloth making, the manufacture of jet ornaments, and the fisheries give employment to many of the inhabitants. Pop. (1911) 37,204.

Scarbroite (skär'bru-īt), a mineral of a pure white color, void of luster, and composed of alumina, silica, ferric oxide, and water, occurring as veins in the beds of sandstone covering the calcareous rock near Scarborough (whence the name).

Scarfing (skär'fing), a particular method of uniting two pieces of timber together by the extremities, the end of one being cut or notched so as to fit into the other, making the part where the junction takes place of the



Various methods of Scarfing.

same thickness as the rest of the pieces of timber.

Scarification (skar-i-fi-kā'shun), the operation of making several incisions in the skin with a lancet or scarificator for the purpose of taking away blood, letting out fluids, etc.; or the removal of flesh about a tooth in order to get at it the better with an instrument.

Scarificator, an instrument used in scarification or cupping. It consists of ten or twelve lancets in a sort of box or case, which are discharged through apertures in its plane surface by pulling a kind of trigger, so that in passing they make a number of incisions in the part to which the instrument is applied.

Scarlatti (skår-lät'tē), ALESSANDRO, an Italian musician, born at Naples in 1650, was educated at Rome under Carissimi, and after residing some time in Germany and at Rome, passed the last years of his life at Naples, where he died in 1725. He composed a great number of motets and about 200 masses.

Scarlet (skår'let), a beautiful bright red color, brighter than crimson. The finest scarlet dye is obtained from cochineal.

Scarlet Bean, or SCARLET RUNNER, a twining plant, the *Phaseŏlus multiflōrus*, a native of Mexico, cultivated as a green vegetable for its long rough pods or as an ornamental plant.

Scarlet Fever, or SCARLATINA, is an extremely infectious disease, not confined to, but common among children. In ordinary cases the beginning of the disease is indicated by great heat and dryness of the skin, shivering, headache, sickness, and sore throat. Another symptom is that the tongue is coated with a white fur through which numerous red points stand up, from which appearance it is called the 'strawberry tongue.' On the second day of the fever a rash appears and quickly spreads over the whole body, begins to fade on the fifth day, and disappears before the end of the seventh. After the rash has gone the skin begins to be shed in large flakes, and this continues about five weeks. During this latter stage the disease is most infectious. At the first symptoms the patient should receive a dose of castor-oil, and then be put in a warm bath. When the fever has gone, strengthening food and frequent bathings should be given, and an equal temperature in the room observed.

Scarlet Fish, a species of carp found in Chinese waters, and thus named because of its color. The eyes in these fish are exceedingly prominent, and the fins are double.

Scarp (skårp), in fortification, the interior slope or talus of the ditch next the fortified place and at the foot of the rampart. See *Fortification.*

Scarpanto (skär'pän-tō; ancient *Carpathos*), an island of the Mediterranean, 28 miles southwest of Rhodes, 27 miles in length and about 6 broad. It contains quarries of marble and mines of iron, and has several harbors. Pop. about 8000.

Scarron (skå-roṇ), PAUL, a French comic author, born at Paris in 1610; died in 1660. His father was a councilor of the parliament and a man of considerable means, and Scarron was educated for the church. Before he was thirty he suffered from ailments that left him paralytic and decrepit for the rest of his life. After suffering from poverty he received a pension from the queen and one from Mazarin, but his hostility to the latter and his writings in favor of the *Fronde* lost him both patrons. He maintained himself, however, by working for the book-sellers, and having at last received part of his paternal inheritance he entertained at his house the brilliant literary society of Paris. In 1652, when almost wholly paralyzed, he married Françoise d'Aubigné, a young girl of considerable beauty, and afterwards known as the famous Madame de Maintenon. Of Scarron's numerous writings the best is the *Roman Comique* (1651); and of his plays *Jodelet* (1645) and *Don Japhet d'Arménie* (1653) have still considerable literary value.

Scarus (skär'us), a genus of fishes of the family Labridæ. See *Parrot-fish.*

Scaup Duck (skaṗ), a species of duck, the *Fuligŭla marīla*. It is common in North America and the north of Europe; and is found in considerable numbers on the British

coasts during the winter months. It feeds on small fish, molluscs, and hence its flesh is coarse.

Scepter (sep'tėr), a staff or baton borne by a monarch or other ruler, as a symbol of office or authority; a royal or imperial mace.

Scepticism (skep'ti-sizm; Greek, *skepsis*, reflection, doubt), in the wide sense, that condition of mental conflict in the search for truth which involves suspension of judgment before opposing testimony. Specifically, however, it has been applied to the doctrines of the Greek philosophers called Pyrrhonists, whose scheme of philosophy denied the possibility of knowing anything with certainty. Pyrrho of Elis (360-270 B.C.), although he himself left no writings, was the founder of this school. Chief among his immediate disciples was Timon of Phlius, who taught that appearances are neither false nor true, that logical reasoning has no adequate sanction, and that imperturbability is the only possible attitude before the facts of life. This position was maintained by the founders of the Middle Academy, Arcesilaus and Carneades, who employed this philosophy of doubt against the dogmatism of the Stoics. Arcesilaus, who lived about 315-241 B.C., held that the report of our senses is untrustworthy. Carneades (213-129 B.C.) declared absolute knowledge to be impossible, and was the author of the doctrine of probability. To the later skeptical school of the first century B.C. belongs Ænesidemus of Cnossus, who expressed his doctrine of negation in ten tropes. These were reduced to five by Agrippa, the first of which is connected with the irreconcilability of human testimony; the second is based on the principle that every proof requires to be itself proved; the third that knowledge varies according to the conditions under which it is acquired; the fourth forbids the assumption of unproved opinion; and the fifth seeks to discredit the reciprocal method of proof in which one thing is proved by another and then the second adduced to prove the first. In later times Al-Ghazzali (1059-1111) taught at Bagdad a philosophic skepticism to enforce the truth of his Mohammedan doctrine. In this method he was followed by Pascal (1623-1662), who sought to establish the necessity of Christian faith by a skeptical exposure of the fallacy of human reason. Among modern skeptics may be mentioned Montaigne, Bayle, D'Alembert, and Hume. The latter limited the range of human reasoning to human experience, and affirmed that any knowledge concerning God or a future state transcends the scope of our faculties. See *Agnostics*.

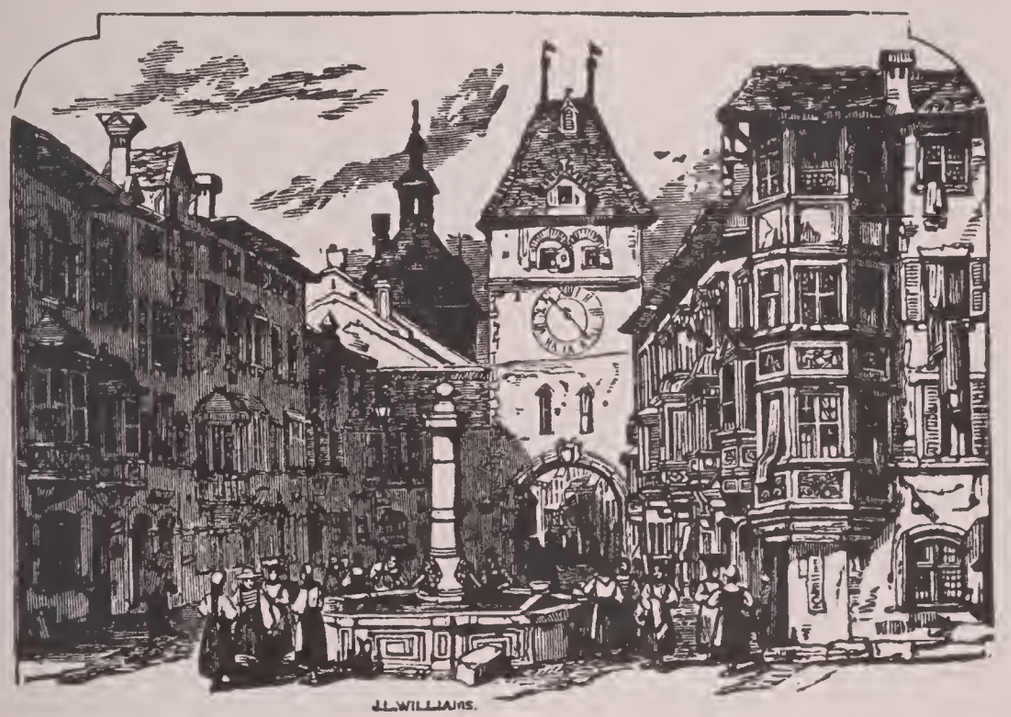
Schabzieger (shåp'tsē-gėr), a kind of green cheese made in Switzerland, to which a special flavor is communicated by the plant *Melilōtus cœrulea* (blue melilot).

Schadow (shå'dō), Johann Gottfried, sculptor, born at Berlin in 1764; died in 1850. He early showed a liking for the fine arts, and studied drawing and sculpture in his native city until he went to Italy, where he wrought from 1785 to 1787 in the museum of the Vatican and of the Capitol. His first great work was the monument erected in the Dorothea Church, Berlin, to the memory of the *Count of the Mark*, and this was followed by the colossal statue of *Ziethen;* the statue of *Frederick the Great* in Stettin: of *Leopold of Dessau* in Berlin; of *Blücher* in Rostock; the *Tauenzien* monument in Breslau; of *Luther* in Wittenberg, etc. Three sons of Schadow devoted themselves to art. The eldest, Rudolf, born in 1785, gained some reputation as a sculptor, and died at Rome in 1822; the second, Friedrich Wilhelm, born September 6, 1789, became a painter of considerable eminence, and was ennobled in 1843; and the third son, Felix, likewise became a painter.

Schaff (shåf), Philip, biblical scholar, was born in Switzerland, Jan. 1, 1819. He studied at Tübingen, Halle, and Berlin; lectured in the latter university in 1842-44, and then went to America, where he was professor in the theological seminary of the German Reformed Church at Mercersburg (Pa.) from 1844 to 1863. In 1864-69 he was lecturer in several theological institutions, and after 1870 was professor of sacred literature in Union Theological Seminary, New York. He was a prolific writer, his works including *History of the Apostolic Church; History of the Christian Church; Creeds of Christendom; Religious Encyclopedia* (as editor), etc. Died October 20, 1893.

Schaffhausen (shåf'hou-zn), a town of Switzerland, capital of the canton of same name, situated on the right bank of the Rhine, 24 miles north of Zürich. It is remarkable for the antique architecture of its houses. The principal edifices are the feudal castle of Unnot or Münot, on a height commanding the town; the parish or St. John's Church; the minster or cathedral, built in 1052-1101, in the Romanesque style, with its ancient bell, made famous by Schiller and Longfellow; the Imthurneum, erected by Herr Imthur,

a London banker, containing a theater, music-schools, and exhibition rooms; library, museum, and the townhouse, built in 1412, and containing some fine wood carving. About 3 miles below the town are the celebrated falls which bear its name, and by which the whole volume of the Rhine is precipitated over a height of more than 70 feet. Pop. 15,403.—The canton is the most northerly in Switzerland, and is situated on the right



Street in Schaffhausen.

or German side of the Rhine; area, 116 sq. miles. The surface is very much broken, being traversed throughout by a series of ridges which ramify from the Jura. The only river is the Rhine. The inhabitants are generally Protestants, and the language spoken is principally German. Pop. 41,454.

Schamyl. See *Shamyl.*

Schandau (shân'dou), a favorite summer resort in Saxon Switzerland, on the right bank of the Elbe, 21 miles S. E. of Dresden. Permanent pop. (1905) 3373.

Scharnhorst (shârn'horst), GERHARD JOHANN DAVID VON, a Prussian general, born in 1756; died in 1813. He served in the Hanoverian army for a number of years, and then (in 1801) transferred his services to Prussia, where he rapidly rose in army rank, and was ennobled in 1804. After the humiliating Peace of Tilsit (1807 — see *Prussia*) he was appointed president of the committee for the reorganization of the army, and it was by his system of short service that Prussia was so well prepared to declare war with France in 1813. In this campaign Scharnhorst accompanied Blücher as lieutenant-general and chief of the staff, and was mortally wounded.

Schaumburg-Lippe (shoum'burh-lip-pė), a principality of the German Empire, in two detached portions; a northern, lying between Hanover, Hesse-Cassel, and Rhenish Prussia, and a southern, between Lippe and Hanover; area, 131 square miles; pop. 43,132. It is drained by a number of small streams, tributaries of the Weser. The soil is fertile, corn is grown for export, and cattle are numerous. Schaumburg-Lippe is a hereditary principality, with a constitution granted in 1868. The diet consists of fifteen members, representing six different estates or orders. Schaumburg-Lippe sends one member to the Bundesrath of the German Empire. The capital is Bückeburg.

Scheele (shēl; Swed. pron. shā'lė), KARL WILHELM, Swedish chemist, born in 1742; died in 1786. He discovered tartaric acid, chlorine, baryta, oxygen shortly after Priestley, glycerine, and arsenate of copper, called Scheele's green.

Scheele's-green, a green pigment consisting of a pulverulent arsenate of copper, first prepared by *Scheele* (see above); it is used both in oil and water-color painting.

Scheffer (shef'ėr), ARY, a French painter, born at Dort, Holland, in 1795; died at Paris, in 1858. He studied in Paris under Guérin, and was early impressed with the Romantic movement. His first picture was exhibited in 1812, and was followed by many genre and historic pictures. Subsequently to about 1827 he turned to the works of Goethe, Byron, Schiller, Dante, etc., and to the Scriptures for the subjects he depicted. He painted a series of pictures from Faust, two *Mignons*, a *Francesca da Rimini*, and a *Beatrice*. Among religious subjects may be mentioned *Christus Consolator*, *Christus Remunerator*, *Christ Bearing His Cross*, *Christ in the Garden of Olives*, *Christ Interred*, etc. His coloring is defective, though his drawing is correct and his taste refined.

Scheldt (skelt; Dutch, *Schelde* — shel'dė; French, *Escaut* — es-kō), one of the most important rivers of Belgium and the Netherlands, rises in the French department of the Aisne; flows circuitously through Belgium; reaches Ghent, where it receives the Lys; at Antwerp attains a breadth of about 1600 feet, and forms a capacious and secure harbor. About 15 miles below Antwerp, shortly after reaching the Dutch frontier, it divides into the East and the West Scheldt, thus forming a double estuary. The whole course is 211 miles.

Schelling (shel'ing), FRIEDRICH WILHELM JOSEPH VON, a German philosopher, born at Leonberg, Würtemberg, in 1775; died in 1854. He studied at Tübingen, for a short time also at Leipzig, and from thence proceeded to Jena. His philosophical studies were mainly guided by Fichte, of whom he was first a colleague, and afterwards successor. In 1803 he was appointed professor of philosophy at Würzburg, and in 1806 member of the Academy of Sciences at Munich, of which he subsequently became secretary. He lectured at Erlangen from 1820-26, and in 1827 became a professor at Munich, whence he was called to Berlin in 1841, and lectured for several years in the university of that city on the philosophy of mythology and revelation. Subsequently he ceased teaching, and lived sometimes at Berlin, sometimes at Munich, or elsewhere. Schelling's system of philosophy, both in its earlier and later developments, was essentially pantheistic, but its later developments are marked by a strong eclectic tendency, which indicate the dissatisfaction of the speculator with his own results The principle of identity—or of one absolute and infinite underlying both nature and spirit, real and ideal, objective and subjective — which he retained throughout, formed a link of connection between the most various systems, and afforded the utmost facilities for an eclectic development. He called his later speculation, based on mythology and revelation, positive philosophy, in contradistinction to his speculation on identity, which he called negative philosophy. The object of positive philosophy he defined as being not to prove the existence of God from the idea of God, but from the facts of existence to prove the divinity of the existent. The principal writings of Schelling are: *Ideas for a Philosophy of Nature* (1797); *The Soul of the World* (1798); *First Sketch of a System of the Philosophy of Nature* (1799); *System of Transcendental Idealism* (1800); *Exposition of My System of Philosophy*, published in the *Journal of Speculative Physics*, edited by him (1801-03); *Bruno, or the Divine and Natural Principle of Things* (1802); *Critical Journal of Philosophy* (in conjunction with Hegel), 1802-03; *Exposition of the True Relation of the Philosophy of Nature to the Amended Theory of Fichte* (1806).

Schemnitz (shem'nits), a mining town of Czechoslovakia, 65 miles N. W. of Budapest. The mines of Schemnitz were long regarded as among the most important in Europe, including gold, silver, lead, copper, iron, arsenic, and sulphur, but the produce has greatly fallen off. Pop. 16,370.

Schenectady (ske-nek'ta-di), a city, county seat of Schenectady Co., New York, 15 miles N. W. of Albany, on the State Barge Canal and the New York Central and the Delaware & Hudson railroads. It is a thriving industrial center. The General Electric Company, with 23,000 employees, has here a very large plant. The American Locomotive Company has over 5000 on its payroll. Other manufactures include mica insulators, varnish, underwear, knit goods, farm machinery, printing, etc. It is the home of Union College (q. v.), one of the oldest institutions of learning in the country. Schenectady was settled in 1662, attacked and burned by French and Indians from Canada in 1690. Pop. (1910) 72,826; (1920) 88,723.

Schérer (shā-rer), EDMOND HENRI ADOLPHE, a French critic, born in Paris in 1815; died in 1889. He studied theology and in 1843 became professor of exegesis at Geneva, a post which he resigned in 1850, and thenceforward was a leading spirit in the liberal movement in Protestant theology.

He was elected to the Assembly in 1871, and four years after became a senator, but it is as a critic of the literature of the eighteenth and nineteenth centuries that he excelled. He contributed largely to the *Temps*, the *London Daily News*, etc., and his collected studies have given him the position of literary successor to Saint-Beuve.

Scherer (shā'rėr), WILHELM, a German scholar and historian of literature, born in 1841 at Schönborn, in Lower Austria; died at Berlin in 1886. He studied at Vienna and Berlin, became professor of the German language and literature at Vienna, and then at Strasburg, and in 1877 went to Berlin as professor of modern German literature. His most important work was his *History of German Literature* ('Geschichte der deutschen Litteratur'), which has been published in English.

Scherzo (skert'zō), in music, generally applied to a passage of a sportive character in musical pieces of some length — for example, in symphonies, sonatas, etc.

Scheveningen (*sh*ā'ven-ing-en), a fishing village and much-frequented watering-place of the Netherlands, in the province of South Holland, 2 miles W. of The Hague. It is situated on sandy dunes, and has a Reformed and a Roman Catholic church, extensive hotel accommodation, etc. There are boat-building yards, etc., but the great staple of the place is the fishing trade. Permanent pop. about 23,000.

Schiaparelli (skē-à-pà-rel'lē), GIOVANNI VIRGINIO, astronomer, born at Savigniano, Italy, in 1835; died July 5, 1910. In 1860 he took charge of the observatory at Milan. He showed the relation between cometary and meteoric matter in important papers 1866 and 1871, and was the first to announce the discovery of the 'canals' of Mars.

Schiavone (skyà-vō'nā), ANDREA, a painter of the Venetian school, whose true name was Medola, born at Sebenico, in Dalmatia, in 1522; died in 1582. He studied under Titian, who employed him in the library of St. Mark, where he is said to have painted three entire ceilings. Two of his compositions are in the church of the Padri Teatini at Rimini, and his *Perseus and Andromeda*, and the *Apostles at the Sepulcher*, are in the royal collection at Windsor.

Schiedam (*sh*ē'dàm), a town of the Netherlands, in the province of South Holland, near the right bank of the Maas, 4 miles west of Rotterdam. It is intersected by numerous canals, and its chief buildings are an exchange, a town-house, a concert-hall, a public library, and various hospitals. The staple manufacture is gin or Hollands, connected with which there are about 200 distilleries. Pop. 32,039.

Schiller (shil'ler), JOHANN FRIEDRICH CHRISTOPH VON, one of the greatest of German poets, was born at Marbach, Würtemberg, Nov. 10, 1759. His father, originally a surgeon in the army, was afterwards a captain, and finally (1770) superintendent of the woods and gardens attached to a residence — the Solitude — of the Duke of Würtemberg. His first poem is said to have been written the day before his confirmation, in 1772. He had for several years received instruction at a Latin school in order to prepare him for the university; but at this time Charles, duke of Würtemberg, founded a school at the Solitude on a military-monastic plan, and offered to take young Schiller as one of the pupils. His father could not refuse such an offer, and in 1773 Schiller was received into this institution. Here he studied jurisprudence; but when the school was removed to Stuttgart, and its scope became extended (1775), Schiller turned his attention to medicine. When sixteen years old he published a translation of part of Virgil's *Æneid* in hexameters in a Suabian periodical, and began an epic, the hero of which was Moses. He still continued his medical studies, however, for in 1780 he wrote an *Essay on the Connection of the Animal and Intellectual Nature of Man*, and in the same year was appointed physician to a regiment in Stuttgart. It was now for the first time that he had enough leisure and freedom to finish his tragedy of *Die Räuber* ('The Robbers'), begun three years previously. He published this piece at his own expense in 1781; it excited an immense amount of attention, and in 1782 it was performed at Mannheim. Arrested for attending the performance without leave of the Duke of Würtemberg, and forbidden to write plays by the same despotic authority, Schiller fled from Stuttgart, was naturalized as a subject of the Elector-Palatine, and settled at Mannheim as poet to the theater (1783). Here the plays of *Fiesco* and *Cabale und Liebe* were soon after produced. In 1785 he went to Leipzig and Dresden, where he studied the history of Philip II. In this way he prepared himself not only to write his drama of *Don Carlos*, which appeared in 1787, but also to publish a *History of the Revolt of the Netherlands*

(1788). Visiting Weimar in 1787 he received a friendly welcome from Wieland, Herder, and Goethe, the latter assisting to procure him (1789) a professorship of philosophy at Jena. Here he lectured on history, and began to publish *Historical Memoirs from the Twelfth Century to the Most Recent Times* (1790); and his *History of the Thirty Years' War* appeared in 1790-93. His first periodical, *Thalia*, begun in 1784 at Mannheim, having ceased in 1793, he formed the plan of publishing a new periodical, *Die Horen* ('The Hours'). It was now also that he returned with renewed ardor to poetry, and produced, particularly after 1795, his finest lyrical poems and ballads. From 1799 he lived in intimate acquaintance with Goethe at Weimar, and published in succession his dramas *Wallenstein*, *Maria Stuart*, the *Maid of Orleans*, the *Bride of Messina*, and *William Tell*. He also adapted Shakespeare's *Macbeth*, Racine's *Phœdra*, etc., for the stage, with which his dramatic works close. In 1802 he was raised to the rank of nobility. He had long been in weak health, and being attacked by fever he died May 9, 1805. His correspondence with Goethe, William von Humboldt, and C. G. Körner has been published, his life has been written by Carlyle, and there are several English translations of his works.

Schilling (shil'ing), JOHANN, a German sculptor, born at Mittweida, Saxony, in 1828; studied art at Berlin and Dresden. In 1868 he became professor at the Dresden Royal Academy. His chief works include the *Four Seasons* at Dresden, Schiller's statue at Vienna, Maximilian's statue at Trieste, *War Memorial* at Hamburg, and the *German National Monument* on the Niederwald, opposite Bingen on the Rhine, with a colossal figure of Germania.

Schinkel (shin'kel), KARL FRIEDRICH, German architect, born at Neu Ruppin, Brandenburg, in 1781; died in 1841. He was educated at Berlin; entered into practice as architect; went to Italy to enlarge his knowledge; and on his return, finding no field for his art, he turned to landscape-painting. In no long time, however, he again devoted himself to architecture, and later became chief director of the public buildings in Berlin. He was architect of the Berlin museum, the Berlin theater, and other prominent buildings, mostly in the Greek style. A collection of his architectural designs was published in twenty-six parts, Berlin, 1820-37; and his *Werke der höhern Baukunst*, Potsdam, 1845-46.

Schist (shist), a geological term applied to rocks which have a foliated structure and split in thin irregular plates, not by regular cleavage, as in the case of clay-slate, nor in laminæ, as flagstones. It is properly confined to metamorphic or crystalline rocks consisting of layers of different minerals, as gneiss, mica-schist, hornblende-schist, chlorite-schist, etc.

Schizomycetes (skiz-o-mī-sē'tēz), a botanical term for Bacteria. It refers to their commonest mode of reproduction, by transverse division. The term Schizophyte is also synonymous with Bacteria.

Schizopoda (skiz-op'o-da), a tribe of long-tailed decapod crustaceans. They are all of small size and marine. The Mysis, or opossum-shrimp (which see), furnishes an example of these creatures.

Schlangenbad (shlång'en-bât), a watering-place of Prussia, in Hesse-Nassau, 6 miles W. N. W. of Wiesbaden, among wooded hills. It consists chiefly of lodging-houses, and two large bathing establishments. The water has a temperature of from 80° to 88°, and is beneficial in hysteria, neuralgia, rheumatism, gout, paralysis, etc.

Schlegel (shlā'gėl), AUGUST WILHELM VON, a distinguished German scholar, born at Hanover in 1767; died at Bonn in 1845. At an early age he showed an aptitude for languages and poetry; studied theology and philology at Göttingen; became a tutor in Amsterdam; contributed to Schiller's periodicals; was appointed professor first at Jena and then in Berlin; engaged in a bitter controversy with Kotzebue; traveled through France, Germany, and Italy with Madame de Staël; and in 1813 acted as secretary to the Crown-prince of Sweden. Five years later he was made a professor in the University of Bonn. He wrote various poems and ballads, delivered lectures on literature and art, published a tragedy called *Ion*, translated the most of Shakespeare's and Calderon's plays into German, and devoted the latter part of his life to Oriental studies and the translation of various works from Sanskrit.

Schlegel, KARL WILHELM FRIEDRICH VON, a brother of the foregoing, born in 1772; died in 1829. He studied philology at Göttingen and Leipzig, and became an accomplished scholar. He early contributed to various periodicals; published *Greeks and Romans*, and in 1798 wrote *Lucinde*, an unfinished romance, and *Alarcos*, a tragedy; and lectured as a privat-docent in the Uni

versity of Jena. In 1803 he joined the Roman Catholic Church; was appointed an imperial secretary at Vienna in 1808; and was councilor of legation for Austria in the Frankfort diet. Besides the lectures which he published his chief works are: *History of the Old and New Literature* (1815); *Philosophy of Life* (1828); *Philosophy of History* (1829); and the *Philosophy of Language* (1830). His wife, a daughter of Moses Mendelssohn, was the author of some works published under Schlegel's name.

Schleicher (shlī'*h*ėr), AUGUST, a German philologist, born in 1821; died in 1868. He was educated at the Gymnasium of Coburg, at Leipzig, Tübingen, and Bonn. In 1850 he was appointed professor of comparative philology at Prague, and in 1857 became honorary professor of the science of language and Old German philology in the University of Jena. His published works embrace a number of linguistic productions, including the well-known *Compendium der vergleichenden Grammatik der indo-germanischen Sprachen* ('Comparative Grammar of the Indo-European Tongues'; 1862).

Schleiermacher (shlī'ėr-mä*h*-ėr), FRIEDRICH ERNST DANIEL, a German Protestant theologian and philosopher, born at Breslau in 1768; died at Berlin in 1834. He studied at the University of Halle; was ordained and appointed assistant preacher at Landsberg; and afterwards became minister in the Charité-Haus (a great hospital) at Berlin. In 1802 he removed to Stolpe.

Schlesien (shlā'zi-en), the German form of *Silesia*.

Schlestadt. See *Schlettstadt*.

Schleswig (shles'vi*h;* Danish, *Slesvig*), a seaport, capital of the Prussian province of Schleswig-Holstein, at the head of the Schlei, a long narrow inlet of the Baltic. The most noteworthy edifices are the cathedral, of the fifteenth century, a fine Gothic pile, with a fine oak altar-screen, and the old ducal castle of Gottorf, now a barrack. The industries include leather goods, machinery, shipbuilding, fishing, etc. The town was an important trading center in 808, and became a bishopric in 948. Pop. (1905) 19,032.

Schleswig-Holstein (hōl'stīn), since 1866 a province of Prussia, bounded on the north by Denmark; east by the Baltic, Lübeck, and Mecklenburg; south by Mecklenburg and the territory of Hamburg; southwest by the Elbe; and west by the North Sea; area, 9273 square miles. Schleswig is the portion lying north of the Eider; Holstein that south of this river. Schleswig-Holstein forms part of the same peninsula with Jutland, to which in its general character it bears considerable resemblance. There are extensive moorlands; the west coast consists of sandy and marshy flats, protected in Schleswig by chains of islands, in Holstein by lofty dykes; the east coast is scooped out into natural harbors; the principal streams flow to the west, towards which for the most part the country slopes. Lakes are numerous. The Eider is the principal river. The country is fertile, and is chiefly agricultural. The great majority of the inhabitants are of German origin. The principal towns are Altona, Kiel, Flensburg and Schleswig, the capital. Schleswig-Holstein, which became a united duchy in 1386, passed over to Denmark in 1773, and was appropriated by Prussia after the war of 1866. (See *Denmark* and *Prussia*.) Pop. 1,504,248.

Schlettstadt (shlet'stät), a town of Germany, in the province of Alsace-Lorraine, on the left bank of the Ill, 26 miles southwest of Strasburg, on the railway to Basel. It was formerly fortified by Vauban, and contains two fine churches of the eleventh and fourteenth centuries, and a fine Gothic gateway. The fortifications have been removed since the Germans have held the town. Pop. (1905) 9700.

Schley (shlē), WINFIELD SCOTT, Rear-Admiral, born at Frederick City, Maryland, Oct. 9, 1839. He was appointed to the Naval Academy from his native State, was graduated in 1859, and took part in the Civil war. In 1884, as commander, he was sent to the relief of Greely in the Arctic region, and returned with the remnant of Greely's expedition, barely saved from starvation. As commodore in 1898 he took part, as second in command of the fleet, in the blockade of Santiago de Cuba and was the senior in actual command at the battle of July 3, 1898, when Admiral Cervera's Spanish fleet was annihilated. He retired in 1901. He has published *The Rescue of Greely* and *Forty-five Years under the Flag*. Died 1911.

Schliemann (shlē'män), HEINRICH, a German archæologist, born in 1822. Having obtained a place as correspondent and book-keeper to an Amsterdam firm, and having been sent by them to St. Petersburg, he established himself there in business on his own account. He traveled widely and acquired many languages, and having made

a fortune commenced a series of archæological investigations in the East. In 1869 he published at Paris his *Ithaque, Le Péloponnese, Troie: Recherches Archæologiques*, an account of his travels in these regions, and this was followed in 1874 by his *Trojanische Alterthümer*, giving the results of his researches and excavations on the plateau of Hissarlik, the alleged site of ancient Troy. In 1875 he commenced excavations at Athens and Mycenæ, and in 1877 discovered the five royal tombs which local tradition in the time of Pausanias asserted to be those of Agamemnon and his companions. Many treasures of gold and silver were brought to light. His *Mycenæ*, a narrative of researches and discoveries of Mycenæ and Tiryns, was published in 1877, with a preface by Gladstone. He received valuable assistance in his investigations from his wife, a native of Greece and an accomplished scholar. His *Troja* (1883) and his *Tiryns* (1886) are in a measure supplementary to his earlier works on Troy and Mycenæ. He died December 29, 1890.

Schlosser (shlos'ėr), FRIEDRICH CHRISTOPH, a German historian, born in 1775. He was educated at Göttingen, in 1812 was appointed professor in the newly-founded Lyceum of Frankfort, and when it ceased to exist in 1814 he became city librarian. In 1817 he was called as professor of history to Heidelberg. His first great historical work, the *History of the World* in a connected narrative (1817-24), was followed in 1823 by his *History of the Eighteenth Century*, which in its subsequently enlarged form won him yet wider fame. His other works include a *View of the History of the Old World and its Civilization* (1824-34), and a *History of the World for the German People* (1844-53). Along with Bercht he edited the collection of *Archives for History and Literature* (1830-35). He died at Heidelberg in 1861.

Schlözer (schleu'tsėr), AUGUST LUDWIG VON, a German historian, born in 1737. After studying at Wittenberg and Göttingen he went as tutor to Sweden, and lived at Stockholm and at Upsala. In 1759 he returned to Göttingen and commenced the study of medicine. In 1761 he proceeded to St. Petersburg as tutor to the Russian historian Müller, and engaged diligently in the study of the Russian language and history. In 1765 he was appointed a professor in the Academy, but subsequently returned to Germany, having been appointed to the chair of political science at Göttingen, a post held by him till his death in 1809. The fruit of his residence and studies in Sweden and Russia was his *Allgemeine Nordische Geschichte* (1772) and a translation and exposition of Nestor's *Russian Annals* (1802). At a later period appeared his *Weltgeschichte*, or *History of the World* (1792-1801).

Schmalkalden (shmål'kål-dėn), a town of Prussia, province of Hesse-Nassau, on the Schmalkalde, 30 miles S. of Eisenach. It is an antique and picturesque town with double wall and ditch, narrow streets, two castles, and a handsome Gothic church (fifteenth century). The staple manufactures are iron and steel wares, and there are extensive mines and salt-works in the vicinity. Pop. 9529.

Schmalkalden, LEAGUE OF, the league formed at the close of 1530 by the Protestant princes of Germany, assembled at Schmalkalden, to resist the aggressive measures contemplated by the Emperor Charles V. It ultimately included seven princes, two counts, and twenty-four cities, representing the whole of Northern Germany, Saxony, Würtemberg, and Denmark, with portions of Bavaria and Switzerland. The object of the league was the common defense of the political and religious freedom of the Protestants, and the confederacy was first intended to continue only for six years, but subsequent events induced them in 1535 to renew it for another period of ten years, and to raise a permanent army to carry out the objects of the league. About this time it was joined, among others, by the king of France, Francis I, though only from political motives, and Henry VIII of England declared himself its protector. The confederacy received a fuller consolidation by a new Protestant confession, drawn up at the instance of John Frederick of Saxony by Luther and other divines, and known as the Articles of Schmalkalden, from the circumstance of their having been signed (1537), like the league itself, at the town of Schmalkalden. These articles were essentially the same as those of the Confession of Augsburg. The league was subsequently crippled by mutual jealousy and the conflict of interests, and its early successes in the so-called Schmalkaldic war were ultimately more than outweighed by the complete rout at Mühlberg and the capture of John Frederick. The ends of the league, however, were ultimately gained through the instrumentality of Duke Maurice, who had been made elector of Saxony, and in 1552 declared war against the emperor, forcing him to

grant the Treaty of Passau, which secured the religious liberty of the Protestants.

Schmitz (shmits), LEONARD, historian, born at Eupen, near Aix-la-Chapelle, in 1807; educated at Bonn under Niebuhr and Welcker. He settled in England in 1836, and was prominent as an educator and writer of text-books, publishing a *History of Rome*, *Manual of Ancient History*, and other works. He died in 1890.

Schnitzer (shnit′zėr), EDWARD (EMIN PASHA), an African explorer, was born in Neisse, in Silesia, March 28, 1840. Studying medicine, he was graduated in 1864. Proceeding to Turkey, he practiced his profession. He adopted the name of Emin and Turkish habits and customs, entering the Egyptian medical service as Dr. Emin Effendi. In 1878 he was appointed by Gordon Pasha governor of the Equatorial Province. Pressed by the Arabs during the Mahdi outbreak, he was rescued from his perilous position by Stanley in 1880. He entered the service of the German East Africa Co., in 1890, and while on an exploring expedition was assassinated in 1892.

Schnitzler (shnitz′ler), ARTHUR, an Austrian novelist and dramatist, born in Vienna in 1862. He studied medicine but turned to literature in 1890. His *Anatol*, a series of playlets depicting life in Vienna, was published in 1893, followed by many other works that won wide popularity. His dramatic dialogue is exquisitely finished and musical.

Schnorr von Karolsfeld (shnor-fon-kå′-rols-felt), JULIUS, a German painter, born at Leipzig in 1794. From 1817 to 1827 he resided in Italy, and was then invited by Ludwig, king of Bavaria, to Munich, where he became professor of historical painting in the Academy of Fine Arts. His frescoes in illustration of the *Niebelungenlied*, and of the lives of Charlemagne, Frederick Barbarosa, and Rudolf of Hapsburg, at Munich, are among the most famous of modern works of this class. In 1846 he accepted an invitation to become director of the picture gallery and professor at the Academy of Fine Arts in Dresden. While here he completed his *Illustrations of the Bible*, which were engraved and published under the title of *Die Bibel in Bildern* (240 plates, large 4to, Leipzig, 1852-60). These have been published in Great Britain, with descriptive English text. They exhibit wonderful animation, variety, and power, and are accounted the finest extensive series of illustrations of the Bible that have ever been produced by one artist. To the Dresden period also belong the oil-painting of *Luther at the Diet of Worms*, and the designs for a window for St. Paul's, London. This window, representing the conversion and cure of St. Paul, was inserted in its place in 1867. He died May 26, 1872.

Schœnus (skē′nus), a genus of bog plants, nat. order Cyperaceæ. The black bog-rush (*Schœnus nigricans*) is the only European species.

Schöffer (sheuf′ėr), PETER, an early printer, born at Gernsheim, near Darmstadt, between 1420 and 1430; educated at the University of Paris, where he was a copyist in 1449; removed to Mainz in 1450, and married the daughter of Johann Fust. He is credited with having perfected the art of printing by devising an easier mode of casting type. He died in 1502. See *Printing*.

Schofield (skō′fēld), JOHN MCALLISTER, soldier, born in Chautauqua Co., New York, in 1831; died March 4, 1906. He graduated at West Point in 1853, was made captain in May, 1861, and brigadier-general of volunteers in November, becoming major-general in May, 1863. After service in Arkansas, he joined Sherman's army, and was sent by him in October, 1864, to reënforce General Thomas at Nashville. He was attacked by Hood at Franklin, repulsed him, and aided in Thomas's brilliant victory. He took part in the operations in North Carolina at the end of the war. He was secretary of war May, 1868, to March, 1869; was commander-in-chief 1888-95, and retired with the rank of lieutenant-general in 1895.

Scholarship (skol′ar-ship), in universities, a certain class of foundations in colleges for the maintenance of students; generally the annual proceeds of a bequest permanently invested.

Scholasticism (sko-las′ti-sizm), the name given to the system of philosophy taught by the philosophers of the middle ages, who were called *scholastics* or *schoolmen* from the circumstance that their philosophy originated in the schools instituted by and after Charlemagne for the education of the clergy. The philosophy here taught consisted in a collection of logical rules and metaphysical notions drawn from the Latin commentators on Aristotle, and from the introduction of Porphyry to the writings of Aristotle. The character of the scholastic philosophy, however, varied considerably at different periods. Historians are not agreed as to

the exact period of its origin. Those who regard particularly its theological character make Augustine its founder; others consider it as having commenced in the Monophysite disputes of the fifth and sixth centuries. The great aim of the schoolmen was to reduce the doctrines of the church to a scientific system. They started with the assumption that the creed of the church was absolutely true. The criterion of truth and falsehood in matters common to philosophy and theology was not sought in observation and in thought itself, but in the dogmas of the church. The first period of the schoolmen may be considered as extending from the ninth to the thirteenth century, and is characterized by the accommodation of the Aristotelian logic, and of Neo-Platonic philosophemes to the doctrines of the church. The period begins with John Scotus Erigena, and numbers, among other names, those of Berengarius of Tours and his opponent Lanfranc, Anselm, archbishop of Canterbury, Roscellinus, Abelard, Peter Lombardus and John of Salisbury. The period is marked by the controversies that raged between the Nominalists and the Realists, and which terminated at length in the triumph of the latter. The second period of scholasticism, extending from the thirteenth to the fifteenth century — from Alexander of Hales to the close of the middle ages, when classical studies were revived and the sciences of nature and human nature began once more to be studied — presents us with the complete development of scholasticism, and also with its dissolution. During this period the Aristotelic philosophy exercised a more marked influence; Realism was also triumphant, until, towards the end of the period, William of Occam rose up as the champion of Nominalism, and in distinguishing thought from being, and the theoretical from the practical, gave to philosophy a wider range and a freer spirit. The zenith of scholasticism is constituted by Thomas Aquinas, a Dominican (died 1274), and Duns Scotus, a Franciscan (died 1308), who were the founders of the two schools into which the entire movement was thenceforward divided. With the separation of theory and practice, and still more with the separation in Nominalism of thought and thing, philosophy was disjoined from theology, and reason from faith. The result of this was that religious minds turned away from a theology which had become a mere formal logical system to take refuge in mystic experiences of the inner life; while others, renouncing theology altogether, sought an outlet for their mental energies in the study of nature and mind. The former of these tendencies culminated in the Reformation, and the latter in modern philosophy.

Scholia (skō′li-a), explanations annexed to Greek or Latin authors by the Greek and Latin grammarians (*scholiasts*). There are many scholia to Greek authors extant, fewer to Latin. The names of the scholiasts are mostly unknown. Those, however, of Didymus, John Tzetzes, and Eustathius, the famous scholiast of Homer, have been preserved. The two last belong to the twelfth century.

Schomberg (shom′berg), Frederick Hermann, Duke of, a distinguished soldier, a native of Germany, born about 1619, the son of Count Schomberg by the daughter of Lord Dudley. He began his military career under Frederick, prince of Orange, and afterwards went to France. He was then employed in Portugal, and was successful in establishing the independence of that kingdom. He commanded the French army in Catalonia in 1672, and was afterwards employed in the Netherlands, where he obliged the Prince of Orange to raise the siege of Maestricht. For these services he was created a marshal of France in 1675; but on the revocation of the Edict of Nantes Marshal Schomberg, who was a Protestant, quitted the French service, and took service under the Elector of Brandenburg. He went to England in 1688 with William III, and after the Revolution was created a duke. He was sent to Ireland in the following year to oppose the partisans of James II, and took Carrickfergus, but was killed at the battle of the Boyne in 1690.

Schomburgk (shom′burk), Sir Robert Hermann, traveler, son of a German Protestant clergyman, was born in 1804. He engaged in commercial pursuits, went to North America, then to the West Indies (1830), and gained the patronage of the Royal Geographical Society of London by a report on the island of Anegada in the West Indies. From 1835 to 1839 he was engaged in the exploration of Guiana, a commission undertaken at the instance of the Royal Geographical Society of London. It was in the course of these explorations that he discovered (1837) the gigantic water-lily, *Victoria regia*. Returning to England in 1839, he received the gold medal of the Royal Geographical Society for a work entitled *Travels and Researches During the Years 1835-39 in the Colony of British Guiana*, etc. In 1840 he was sent to make a survey of

British Guiana for the government, and in 1844 received the honor of knighthood for his services. From 1848 to 1853 he acted as British representative to the Republic of Santo Domingo, and in 1857 was appointed to a similar post at Bangkok, in Siam. He died at Berlin in February, 1865. In addition to the works already alluded to he wrote a *Description of British Guiana* (1840), a *History of Barbadoes* (1847), and other works.

Schönbrunn (sheun'brun), a royal palace in the environs of Vienna. See *Vienna.*

Schönebeck (sheu'nė-bek), a town in the government of Magdeburg, Prussia, on the left bank of the Elbe, 9 miles S. S. E. of Magdeburg. It is a very ancient place; and an important salt-mining center. Pop. 17,786.

Schöningen (sheu'ning-en), a town of Germany, in Brunswick, 20 miles S. E. of Brunswick, with a salt-works, chemical works, etc. Pop. 9298.

Schoolcraft, Henry Rowe, ethnologist and geologist, born at Watervliet (now Guilderland), in Albany county, New York, in 1793. He was educated at Union and Middlebury colleges, and in 1816 commenced an unfinished serial work on glass-making, entitled *Vitreology.* In 1817-18 he made a journey to the west, with the object of extending his knowledge of geology and mineralogy, and on his return published *A View of the Lead Mines of Missouri,* etc. In 1820 he was appointed geologist to the expedition despatched by the government to explore the sources of the Mississippi, and in 1821 was appointed secretary to an Indian conference at Chicago. In 1822 he was appointed agent for Indian affairs in the northwestern provinces, and having married a woman of Indian descent, devoted himself to the investigation of the languages, ethnology, and antiquities of the Indians. From 1828 to 1832 he was a member of the territorial legislature of Michigan. In 1832 he conducted a government expedition to the Upper Mississippi, in the course of which he explored the sources of that river. In 1836 he negotiated the purchase for the government of 16,000,000 acres in this region, and after this he was appointed acting superintendent of Indian affairs for the northern department. In 1847 he was appointed by the government to prepare an extensive work on the Indians, which appeared under the title of *Historical and Statistical Information Respecting the History, Condition, and Prospects of the Indian Tribes of the United States* (1851–57). Besides the works already mentioned we have from his prolific pen *Algic Researches,* comprising inquiries respecting the mental characteristics of the North American Indians; *Thirty Years with the Indian Tribes of the Northwestern Frontier; The Indian in His Wigwam;* and the *Myth of Hiawatha and other Legends;* besides poems, lectures, reports, etc. For his *Lectures on the Indian Languages* he received the gold medal of the French Institute. Schoolcraft married a second time in 1847. He died at Washington December 10, 1864.

Schoolmen. See *Scholasticism.*

Schools. See *Education, Gymnasium, Normal Schools, Real Schools,* etc., also articles on the various countries.

Schooner (skö'ner), a small fast-sailing sharp-built vessel with two masts, and the principal sails of the fore-and-aft type. There are two chief kinds of schooners, the top-sail schooner and the fore-and-aft schooner, the former

Top-sail Schooner.

carrying a square top-sail and top-gallant sail (with sometimes a royal) on the fore-mast, and the latter having fore-and-aft sails on both masts, with sometimes a square sail on the fore-mast. The first schooner is said to have been launched at Gloucester, Mass., in 1713. Square top-sails are not used on schooners in the United States, where schooners with more than two masts have been introduced; one with as many as seven masts.

Schopenhauer (shō'pen-hou-ėr), Arthur, a German philosopher, born at Danzig in 1788. His father was a banker, and his mother, Johanna Schopenhauer, attained considerable distinction in the literary world as a writer of books of travel and novels. In his youth he traveled in France and

England, and acquired an extensive knowledge of the language and literature of both these countries. In 1809 he entered the University of Göttingen, where he studied philosophy, and afterwards went to Berlin and Jena. He graduated at Jena in 1813 with an essay entitled *Ueber die vierfache Wurzel des Satzes vom zureichenden Grunde* ('Fourfold Root of the Principle of Sufficient Reason'), in which he lays down the basis of his future system. From 1814 to 1818 he lived at Dresden, and occupied himself principally with the preparation of his most important work—*Die Welt als Wille und Vorstellung* ('The World as Will and Idea'), 1819. Previous to this he had published a work on optics (*Ueber das Sehen und die Farben*, 1816). In 1818 he visited Rome and Naples, and from 1822 to 1825 was again in Italy, returning in the latter year to Berlin. Here as a private lecturer he met with little success, and on the outbreak of cholera in 1831 he left the capital and spent the remainder of his life in private at Frankfort-on-the-Main, devoting himself to the elaboration of his system. He died in 1860. His later works are *Die beiden Grundprobleme der Ethik* ('The Two Fundamental Problems of Ethics'; Frankfort, 1841) and *Parerga and Paralipomena* (Berlin, 1851). The philosophical system of Schopenhauer has for its fundamental doctrine the proposition that the only essential reality in the universe is *will*, in which he includes not only conscious desire, but also unconscious instinct, and the forces which manifest themselves in inorganic nature. What are called appearances exist only in our subjective representations, and are merely forms under which one universal will manifests itself. Between this universal will and the individuals in which it appears there are a number of ideas, which are stages in the objectivication of the will. Throughout nature, from the lower animals downwards, the will works unconsciously, and it only attains consciousness in the higher stages of being, as man. All intelligence serves originally the will to live. In genius it is emancipated from this servile position, and gains the preponderance. Upon this foundation Schopenhauer rears his æsthetical and ethical structures; the former of which derives much from the Platonic system, while the latter resembles in maintaining the necessity of entirely subduing the sensuous nature in man, without determining positively the true end of spiritual life, the Buddhistic doctrine of Nirvana. The final teaching of Schopenhauer is, therefore, that of a philosophic pessimism, having as its ideal the negation of the will to live.

Schorel (skō'rāl), or SCOREL, JAN VAN, a Dutch painter, who received his name from Schoorl, a village near Alkmaar, where he was born in 1495. He studied under William Cornelis, Jakob Cornelis, and Mabuse, came under the influence of Dürer at Nuremberg, and afterwards visited Venice, Jerusalem, and Rhodes, and resided several years in Rome, returning in 1525. He died at Utrecht in 1562. Italian influence is specially discernible in his works.

Schorl. See *Tourmaline.*

Schottische (shot-tēsh'; a French form of the German word for Scottish), a fanciful name given to a slow modern dance in ¾ time, somewhat resembling a polka.

Schreiner (shrī'ner), OLIVE, novelist, was born at Capetown, South Africa, about 1860, daughter of a Lutheran clergyman. Her *Life on an African Farm* (1883), won her a wide reputation by its graphic picture of Boer farm life and exposition of soul problems. Another notable story was *Trooper Peter Halket of Mashonaland*, and several later works have appeared. Her brother, W. P. Shreiner, became premier of Cape Colony in 1898.

Schubert (shö'bert), FRANZ, one of the greatest composers of modern times, born at Vienna Jan. 31, 1797, the son of a teacher. He commenced his musical education in his seventh year, and in 1808 was admitted among the choristers of the court chapel. He soon acquired particular efficiency on the piano and the different stringed instruments, so that in a short time he was able to take the part of first violin in the orchestra. After he left the court chapel he supported himself by teaching music, devoting himself in obscurity and neglect to original composition. He achieved success in almost all kinds of music, but his genius was specially noteworthy for its opulence in melody and lyric power. His songs and ballads, as exemplified in his three principal collections, the *Winterreise* (1826-27), the *Müllerlieder* (1828), and the *Schwanengesang* (1828), may be said to have revolutionized the *Lied* in making the accompaniment not less interpretative of the emotions of the poem than the vocal part, and in breaking through the limitations of the old strophic method. Besides his six hundred songs he left about four hundred other compositions,

including fifteen operas, six masses, and several symphonies. Two only of the operas, *Rosamond* and the *Enchanted Harp*, were performed during his life, and they are considered inferior to his unproduced *Fierabras*. His symphonies take a higher rank, the Seventh (in C major) being ranked by Mendelssohn and Schumann with Beethoven's. His entire work justifies Liszt's description of him as the most poetic of musicians. He died in Vienna November 19, 1828.

Schumann (shö'mȧn), ROBERT, musical composer and critic, born at Zwickau in the Kingdom of Saxony June 8, 1810. He studied law at Leipzig, but in 1830 finally devoted himself to music under the tuition of Friedrich Wieck and Heinrich Dorn. The daughter of the former, the celebrated pianiste Clara Wieck (born 1819), became his wife in 1840. In 1834 he commenced his *Neue Zeitschrift für Musik*, a journal which was to herald an ideal music, and which, for the ten years of his more intimate connection with it, exercised an important influence upon the development of the art, not incomparable with that of Lessing's *Hamburg Dramaturgy* in drama. Prior to 1840 his principal works were the *Fantasias*, the *Scenes of Childhood*, the *Etudes Symphoniques*, the *Kreisleriana*, the *Abegg variations*, the *Papillons*, the *Carnival*, and two sonatas in F sharp minor and G minor. In the year following his marriage he published nearly one hundred and fifty songs, many upon Heine's words, and all marking an advance upon previous composers in the fidelity and subtlety with which they reproduced the most delicate shades of meaning in the poems selected for musical treatment. He then commenced his great series of orchestral works, his symphony in B flat being first performed at the close of 1841. It was followed by his *Overture Scherzo and Finale*, his D minor symphony, three quartets, the piano quintet and quartet, the cantata *Paradise and the Peri*, the C major symphony (1846), *Genevieve* (1847). *Manfred* (1848), the *Faust* music (1850), the E flat symphony (1851), and many other works. Under stress of work, however, his reason failed him, and after an attempt to drown himself in 1854 he was confined in a lunatic asylum, where he died July 29, 1856. In the line of musical descent Schumann stands between Beethoven and Wagner.

Schumla. See *Shumla*.

Schurman (shur'man), JACOB GOULD, educator, born at Freetown, Prince Edward's Island, in 1854. He became professor of philosophy in Acadia College, 1880-82; in Dalhousie College, Halifax, 1882-86; subsequently at Cornell College, of which he has been made president since 1892. In 1899 he was made president of the first Philippine Commission. He wrote a number of works on evolutionary and philosophical subjects, etc.

Schurz (shörz), CARL, an American soldier and statesman, was born near Cologne, Germany, March 2, 1829, and educated at Bonn University. He joined Professor Kinkel in the revolutionary movement of 1848-49, escaped capture and effected Kinkel's escape from prison. He made his way to the United States in 1852, settling in Wisconsin, where he gained prominence in politics, lectured and practiced law. In 1861 he was sent as American Minister to Spain, but soon returned, entered the army in the Civil war, and was made brigadier-general and finally major-general of volunteers, taking part in several battles. After the war he engaged in journalism, starting the *Detroit Post* in 1866. Two years later he removed to St. Louis, and was elected U. S. Senator from Missouri in 1869. In 1877 he became Secretary of the Interior under President Hayes, and in 1881-84 was editor of the *New York Evening Post*. He was an able orator and writer, publishing a finely written *Life of Henry Clay* in 1887 and a *Life of Lincoln* in 1892. He died May 14, 1906.

Schuyler (skī'ler), EUGENE, historian and traveler, was born at Ithaca, New York, in 1840; was graduated from Yale and at the law school of Columbia College; in 1867 was made United States Consul at Moscow and in 1869 at Reval, and secretary of the American legation in Russia. He traveled in Turkestan in 1873, was consul-general at Constantinople 1876-78 (when he traveled in Bulgaria and made an important report on the Turkish atrocities in that country). He held other consulships, and was made U. S. minister at Athens and representative for Roumania and Servia. His works include *Turkestan*, *The Cossacks*, *Life of Peter the Great*, etc. He died at Cairo July 18, 1890.

Schuyler, PHILIP, soldier and senator, was born at Albany, New York, in 1733; died in 1804. He served in the French and Indian war in 1756, was made major-general of the Revolutionary army in June, 1775, and was about to lead an army to Canada

when he was taken sick and was replaced by General Montgomery. He commanded the army operating against Burgoyne in 1777, but was removed by Congress and succeeded by General Gates, who won the honor which justly belonged to Schuyler. A court of inquiry vindicated him of the charges against him. He declined again to take command of an army, though he rendered important military services. He was a member of Congress 1778-81, was in 1789 elected to the first United States Senate, and was again elected in place of Aaron Burr in 1797.

Schuylkill (sköl'kil), a river of S. E. Pennsylvania, passing through Philadelphia, where it joins the Delaware; length, 120 miles.

Schuylkill Haven, a borough of Schuylkill Co., Pennsylvania, 4 miles S. of Pottsville. It has large car shops, dye works, underwear and shoe factories, rolling mills, etc. Pop. 5437.

Schwab (shwåb), CHARLES M. (1862-), American steel merchant, born at Williamsburg, Pa., educated at St. Francis' College. He was superintendent of the Homestead Steel Works, 1887-89; president of the United States Steel Corporation 1901-03, and later became chairman of the board of Bethlehem Steel Corporation. In April, 1918, he was appointed director general of shipbuilding under the U. S. Shipping Board, and was largely responsible for the speeding up of work at the Hog Island (q. v.) yards.

Schwabach, ARTICLES OF, a confession of faith drawn up by Luther for the princes and cities assembled in 1529 at Schwabach.

Schwäbisch-hall (shvā'bish-hål), or HALL, a town of Würtemburg, in the circle of Jaxt, beautifully situated in the deep valley of the Kocher, 35 miles northeast of Stuttgart. It is a picturesque old town, and has extensive salt-works and salt-baths. From the thirteenth century till 1802 Hall was a free imperial city. Pop. 9225.

Schwanthaler (shvån'tä-lėr), LUDWIG MICHAEL, a German sculptor, born at Munich in 1802, where his father, the court sculptor, died in 1821. On the death of his father he succeeded him, and executed various commissions for King Maximilian, and a great number for his successor, King Ludwig. After a short residence in Rome in 1826 he returned to Munich and executed important sculptures for the Glyptothek, a statue of Shakespeare for the theater royal, etc. In 1832 he again visited Rome, remaining there two years. In 1835 he was made professor in the Academy of Arts in Munich. Among his more important works may be specified fifteen colossal statues for the principal pediment of the Walhalla, on the Danube, near Ratisbon; the fifteen figures of the *Battle of Arminius*, for the northern pediment of the Walhalla; the great bas-relief frieze, more than 250 feet long, in the Barbarossa Hall of the royal palace, Munich; the pediment group for the Art Exhibition buildings, Munich; the colossal bronze statue of *Bavaria*, 70 feet high, in front of the Ruhmeshalle (Hall of Fame), Munich; a marble statue of the Emperor Rudolf for the cathedral in Spires; a statue of Mozart for Salzburg; a marble group of *Ceres and Proserpine* for Berlin; and numerous designs for sculptors and painters. He died in 1848. Schwanthaler was the chief representative of the romantic school in sculpture, and his works are often deficient in truth to nature and reality.

Schwarz (shvårts), BERTHOLD, born in the first half of the fourteenth century, a Franciscan friar of Germany, formerly regarded as the inventor of gunpowder and firearms. The invention of gunpowder, however, is probably at least as old as the time of Roger Bacon (d. 1292), but Schwarz may perhaps be credited with the invention of field artillery. In 1380 he was commissioned by the Venetian government to cast some cannons. The price agreed upon not being forthcoming he became importunate, and was thrown into prison, where it is believed he died in 1384.

Schwarz, CHRISTIAN FRIEDRICH, Protestant missionary, born in 1726 at Sonnenburg, in Brandenburg, educated in his native town and at Küstrin till 1747, when he proceeded to the University of Halle. In 1750 he sailed from London for Tranquebar, the seat of a Danish mission, where he labored till 1766, when his services were accepted by the Society for Promoting Christian Knowledge. He then removed to Trichinopoly, and afterwards to Tanjore. His influence in India was shown by the fact that Hyder Ali admitted him as an ambassador for the negotiation of peace after refusing all other envoys, and that his personal guarantee of payment was sufficient to procure the relief of Tanjore from imminent famine. He died in 1798.

Schwarzburg - Rudolstadt (shvårts'burh-rö-dol-ståt), a German principality, consisting of several isolated portions, situated between Prussian Saxony, the Saxon duchies, and the principality of Reuss. It lies on the northern side of the Thuringian Forest, and has an area of 362 square miles. The surface is rugged, and the soil by no means fertile. The most important crop is flax, the culture of which is almost universal. A great part of the land is devoted to pasture, and great numbers of cattle are reared. The minerals include brown coal, iron, slate, and salt. The principal manufactures are glass and porcelain. The inhabitants are almost all Lutherans. The capital is Rudolstadt. Pop. (1905) 96,835.

Schwarzburg - Sondershausen, a German principality on the northern side of the Thuringian Forest, between the territories of Prussian Saxony and the Saxon duchies, and consisting of several distinct portions; area, 332 sq. miles. It is more fertile than Schwarzburg-Rudolstadt, producing corn for export. One of the principal sources of revenue is derived from the forests, which furnish excellent timber. Flax also is extensively cultivated, and great numbers of cattle, sheep, and swine are reared. The only manufacture of any importance is porcelain. The inhabitants are almost all Lutherans. The capital is Sondershausen. Pop. (1905) 85,152.

Schwarzenberg (shvårts'en-berh), ADAM, COUNT OF, born in 1587. He was prime-minister to the Elector of Brandenburg, and all-powerful during the Thirty Years' war, causing great calamities to the electorate of Brandenburg by promoting an alliance with Austria against the Swedish Protestant League. When the 'great elector' assumed the reins of government he imprisoned Schwarzenberg in the fortress of Spandau, where he died of apoplexy in 1641.

Schwarzenberg, FELIX LUDWIG JOHANN FRIEDRICH, PRINCE OF, an Austrian statesman, born in 1800, entered in 1818, as cadet, a regiment of hussars, and advanced to be captain; in 1824 went to St. Petersburg as an attaché to the embassy, and was subsequently employed in connection with the embassies at London, Brazil, Paris, Berlin, Turin, Parma, and Naples. Returning to Vienna from Naples in 1848 he reëntered the army, but soon after, on the suppression of the popular rising in Vienna, he was called to be the head of the new government. His great object was to govern Austria as a single state in a military and absolute manner — still not without some inclination to internal reforms; and to establish the preponderance of the Austrian power in Germany and Central Europe; and this, after the suppression of the Hungarian revolt, he largely succeeded in doing. He died in 1852.

Schwarzenberg, KARL PHILIPP, PRINCE OF, an Austrian field-marshal, born at Vienna in 1771, served in the early wars of the French revolution, taking part in the battles of Würzburg, Ulm, Austerlitz, and Wagram. He negotiated the marriage between Napoleon and Maria Louisa. In the campaign of 1812 he commanded the Austrian auxiliary corps in Galicia, and at the close of the year received the staff of field-marshal-general. After Napoleon's return from Elba he commanded the allied forces on the Upper Rhine, and though the contest was decided at Waterloo without his participation, he took part in the subsequent movement upon Paris. He died in 1820.

Schwarzwald. See *Black Forest.*

Schwatka (swat'ka), FREDERICK, explorer, was born at Galena, Illinois, in 1849; died in 1892. He was graduated from West Point in 1871, and served as a cavalry lieutenant on the frontier till 1877, meanwhile studying law and medicine, and being admitted to the Nebraska bar. After exploring the course of the Yukon, he resigned in 1884. In 1878-80 he commanded the Franklin search expedition to the Arctic seas, and discovered and buried the skeletons of many of Franklin's lost party. He made later explorations in Alaska, and published works describing his journeys.

Schwedt (shvet), a town in Prussia, on the left bank of the Oder, 24 miles southwest of Stettin. The principal edifice is the old castle, in which a branch of the margraves of Brandenburg resided. Its manufactures are chiefly tobacco and cigars. Pop. (1905) 9530.

Schwegler (shvāg'lėr), ALBERT, a German philosophical writer and theologian, born in 1819. He was educated at Tübingen (1836-40), where he became a privat-docent, and subsequently extra-professor of Roman literature and antiquities, and latterly of ancient history. He died in 1857. His *Geschichte der Philosophie* ('History of Philosophy') is widely known outside Germany through the translations of

Professor Seelye, of Amherst, and Dr. Hutcheson Stirling. His other chief works were *Das Nachapostolische Zeitalter* ('The Post-Apostolic Age,' 1846), *Geschichte der Griechischen Philosophie* ('History of Greek Philosophy,' 1859), and editions of the *Clementine Homilies*, *Aristotle's Metaphysics*, etc.

Schweidnitz (shvīt'nits), a town of Prussia, in Silesia, on a height above the Weistritz, 29 miles southwest of Breslau. Its manufactures include machinery, woolens, linens, furniture, earthenware, carriages, gloves, beer, and spirits. It was made a regular fortress by Frederick the Great, and figured much during his wars. During its last siege, in 1807, it was taken in thirty-six days by the French, and its outworks were dismantled. Its fortifications were removed in 1864. Pop. (1905) 30,540.

Schweinfurt (shvīn'furt), a town of Bavaria, on the Main, which is spanned by two bridges, 24 miles N. N. E. of Würzburg. It is partly surrounded by old walls, and was long a free imperial city. It has a handsome town-house of 1570, and a gymnasium founded by Gustavus Adolphus. The manufactures include Schweinfurt green, white-lead, and other colors. Pop. 18,416.

Schweinfurt Green. See *Emerald Green.*

Schwerin (shvā-rēn'), the capital of Mecklenburg-Schwerin, on the western shore of the lake of same name and other smaller lakes, 60 miles east of Hamburg. It is pleasantly situated, has a fine old Gothic cathedral (thirteenth to fifteenth centuries), a grand-ducal palace on an island, grand-ducal museum and picture-gallery, and an arsenal. The manufactures consist of machinery, carriages, woolen and linen cloth, lacquer and earthenware, etc. Pop. (1910) 42,578.

Schwyz (shvēts), a central canton of Switzerland, bounded on the north by the Lake of Zürich and canton St. Gall, west by Zug and Luzern, south by Lake Luzern, and east by Glarus; area, 353 square miles. It belongs to the so-called mountain cantons, being traversed in all directions by lofty hills, including the Mythen, the Rigi, the Rossberg, the Drusberg, etc. The whole canton belongs to the basin of the Rhine, more than two-thirds of the surface being drained by the Sihl and the Lake of Zürich; a third, by the Lake of Luzern, chiefly by means of the Muotta; and the remainder, forming only an unimportant portion, by the Lake of Zug. The chief industry is the rearing of cattle, sheep and swine. The canton is very poor in minerals. Manufactures are almost confined to some cotton and silk spinning and weaving. Schwyz being the most important of the cantons which first threw off the yoke of Austria, gave the name to the whole confederation. Its present government is an extreme democracy, the whole power, legislative and executive, being lodged in the male population of legal age, who hold a general assembly every two years. The great body of the inhabitants are Roman Catholics. Pop. 55,385.— SCHWYZ, the capital, is a straggling and picturesque town at the foot of the Mythen, about 1680 feet above the sea, with a handsome parish church and an interesting town-hall. Pop. 7398.

Sciacca (shäk'kå), a seaport of Sicily, on the side of a hill rising from the shore, 30 miles W. N. W. of Girgenti. It is surrounded by old fortifications, has an old cathedral, and interesting mediæval building; but the trade is small. Pop. (1906) 24,645.

Sciæna (sī-ē'na), a genus of teleostean fishes, belonging to the Acanthopteri, and forming the type of a family — the Sciænoids, allied to the perches. The most important of the genus is the *S. aquila*, the *maigre* of the French, whose chief habitat is the Mediterranean. See *Maigre.*

Sciatica (sī-at'i-ka), a term used in medicine to denote a rheumatic affection, in which the pain stretches along the course of the great sciatic nerve, that is, from the hip along the back part of the thigh towards the ham of the leg. There is stiffness and pain, increased by any change of temperature and moisture; there is generally swelling of the limb at the commencement of the disease, but after repeated attacks the limb seems to shrink, owing to the wasting of the muscles. In some cases the articulation of the hip seems affected, and permanent immobility of the limb takes place.

Scicli (shek'lē), a town of Sicily, province of Syracuse. Pop. (commune) 16,277.

Science (sī'ens), a term applied to the generalized and systematized divisions of knowledge. Science and philosophy resemble each other in so far as they both have to do with knowledge; but while the latter deals with the whole sum of knowledge, the former takes up special branches of it, and it does not necessarily go back to first principles like philosophy. Given a sufficient number of inter-related facts, they may be so

arranged and classified, by referring them to the general truths and principles on which they are founded, as to constitute a well-certified and more or less complete branch of knowledge, that is, a science. The sciences are broadly divided into pure or theoretic sciences and applied or practical sciences, the latter being definable as the knowledge of facts, events, or phenomena as explained, accounted for, or produced by means of powers, causes, or laws; the former as the knowledge of these powers, causes, or laws, considered apart or as pure from all applications. To the class of pure or fundamental sciences belong mathematics, physics, chemistry, psychology, and sociology; to the applied or concrete belong geology, mineralogy, botany, zoology, meteorology, geography, ethics, politics, law, jurisprudence, logic, grammar, rhetoric, philology, and political economy; navigation, engineering, and practical mechanics; surgery, materia medica, etc.

Scientific Management, a term applied to the efforts of industrial engineers to further the common interests of employers, workmen, and the public in general by eliminating avoidable wastes, general improvement in processes and methods of production, and more scientific distribution of income. As compared with ordinary or conventional management, scientific management is characterized by more critical observation, accurate description, analysis and classification of data concerning equipment, materials, and personnel and the conscious application of the resulting principles to all the activities of industry. It aims to substitute exact knowledge for guesswork and rule-of-thumb methods.

In practice, systems of scientific management are characterized by manifold diversity, but have the following features in common: (1) elementary time study and task setting, which involves an analysis of a job into the component elementary movements of the machine and the worker, and the determination by means of a stop watch of the time required to complete each of the movements and the time necessary for rest and other delays; (2) piece rate methods of wage payment, whereby success on the part of the worker in attaining production standards set as the result of job analysis and time study is rewarded by wages above the prevailing market rates; (3) motion study, which consists of a careful study and analysis of methods with a view to eliminating waste motion and conserving human energy; (4) systematic selection and training of workers, so that there will be adaptation of the worker to the task according to intellectual and physical capacities; (5) routing and scheduling, or the determination of when, where, and by whom the work is to be performed so that operation from the standpoint of time and place may be controlled and coordinated; (6) thorough standardization and scientific arrangement of equipment; (7) written instructions covering in detail information concerning methods of work; (8) accurate control over the purchase, receipt, storage, issuance, and accounting of materials and supplies.

Mr. Frederick W. Taylor is generally acknowledged to have been the founder of scientific management and at the time of his death in 1915 was its leading exponent. Development began between 1880 and 1890 with the attempt of Mr. Taylor to determine accurately the daily amount of product which a worker in a given occupation could efficiently produce. Research in the problem led to the gradual growth of the 'Taylor system,' a term that has been used synonymously with scientific management. An important outgrowth of these first studies was the discovery by Mr. Taylor and Mr. Maunsel White, of high-speed tool steel. The first systematic treatise on scientific management was contained in 'A Piece-Rate System,' a paper read by Mr. Taylor in 1895 before the American Society of Mechanical Engineering. Later works of a more extended nature by the same author are *Shop Management* (1903), and *Principles of Scientific Management* (1911). Apart from the work of Mr. Taylor and his few associates at this time, the methods and principles of Mr. Harrington Emerson, author of *Efficiency as Basis for Operation and Wages*, *Twelve Principles of Efficiency*, etc., should be noted.

It was not until 1910 that the attention of the general public was called to the significance of the new developments in the field of management. In that year, Mr. Louis D. Brandeis, representing the shippers in hearings before the Interstate Commerce Commission on proposed increases in freight tariffs, contended that additional freight charges would be unnecessary if scientific management were adopted by the railroads. This statement and the testimony of industrial engineers who were called to verify it was given extensive publicity. The popular and technical periodical press allotted much space to the subject and since that time widespread interest has been maintained.

Installations which, in the early years of the movement, were confined almost entirely to metal-working establishments

since 1910 have extended to other fields of manufacturing. Likewise, the strict adherence to the methods of one or two leaders which characterized the movement in the beginning has given way to broader concepts. The World War served as an impetus to the movement because of the imperative need for greater production and because of the contact which existed then between industrial engineers, almost all of whom were in government bureaus having wartime control over industrial plants, and the managers of those plants. Courses of instruction in the theory and practice of scientific management given by most engineering schools and collegiate schools of commerce have also done much to stimulate the movement.

Organized labor may be said to be opposed to some phases of scientific management, especially to the use of the stop watch in determining piece rates. This attitude was instrumental in causing the passage of a law by Congress in 1915 forbidding the use of the stop watch or other time-measuring devices in government arsenals. A presentation of scientific management in its relations to labor, especially trade union objections, is contained in *Scientific Management and Labor* by Mr. R. F. Hoxie (1915).

Professional societies which embrace the subject are: the Taylor Society—a Society to Promote the Science and the Art of Administration and of Management, and the Society of Industrial Engineers. Among the more important periodical publications in the field may be mentioned *Industrial Management* and *Administration.* In addition to the works mentioned above, books of general interest are: *Scientific Management*, A History and Criticism, by H. B. Drury (1915); *Scientific Management*:—a collection of the more significant articles describing the Taylor System of Management (with bibliography), edited by C. B. Thompson (1914); *Henry L. Gantt Chart: a Working Tool of Management*, by Wallace Clark (1922), etc.

Industrial engineers other than those enumerated who have made contributions to the field are: Carl G. Barth, Horace K. Hathaway, Morris L. Cooke, Sandford E. Thompson, Frank B. Gilbreth, and Henry P. Kendall.

Scilly Islands (sil'i), a group of granitic islands belonging to England, forming part of the county of Cornwall, at the entrance to the English Channel, about 30 miles west by south of Land's End. The islands have an area of 4000 acres, mainly devoted to flora culture. Pop. (1921) 1749.

Scimitar (sim'i-tar), a kind of sword in use among eastern nations. The blade is nearly semicircular in form, with the edge upon the convex side. This form, while ill adapted for thrusting, is well adapted for striking.

Scio (sī'ō), or Chios (kī'os), an island in the Ægean Sea, separated from the coast of Asia Minor by a channel not more than 7 miles wide where narrowest, and about 53 miles west of Smyrna. It is of a somewhat quadrangular form, 32 miles long from north to south, with a mean breadth of about 12 miles; area, 320 square miles. The surface exhibits a number of limestone ridges, separated from each other by verdant and fertile valleys. There are no perennial streams; but an abundant supply of water is obtained from wells. The principal products are wine, oil, cotton, silk, oranges, and other fruits, and more especially mastic. Originally colonized by the Ionians, the island has changed hands repeatedly, passing from the Greeks to the Turks, to the Venetians, to the Genoese, in whose hands it remained from 1346 to 1566, when it was taken by the Turks. Following the Balkan wars (q. v.) it became a part of Greece in 1913. During the European War, 1914-18, it was the scene of much military and naval activity. Pop. (1920) 61,873.

Scio, or Kastro, the chief town of the island Scio or Chios, situated near the middle of the east coast, carries a considerable trade. Pop. 14,500.

Scioppius (stse-op'pi-us), properly Kaspar Schoppe, a German theological controversialist, born in 1576. He renounced Protestantism about 1599, and the whole of his subsequent career was marked by venomous attacks on his former co-religionists and his personal enemies. His rancorous life terminated in 1649. His works include *De Arte Critica, Elementa Philosophiæ, Stoicæ Moralis, Paradoxa Literaria*, and *Rudimenta Grammaticæ Philosophicæ.*

Scioto (sī-ō'tō), a river of Ohio, with a general southerly course, its length about 200 miles, and flowing into the Ohio River at Portsmouth by a mouth 150 yards wide. It is navigable for boats about 130 miles.

Scipio Africanus (sip'i-ō) The Elder. Publius Cornelius Scipio Africanus Major, one of the most illustrious of Roman warriors, was born about 235 B.C. At the battle of the Ticinus against the Carthaginians in 218 B. C. he is said to have saved the life of his father. Two years later he was one of the few who

escaped from the fatal battle of Cannæ, when he succeeded in gathering together the remains of the defeated army and saving Rome. In 212 B.C. he was unanimously elected ædile, and a few years after was appointed proconsul in Spain. His first successful enterprise of importance was the conquest of New Carthage, the stronghold of the Carthaginians in Spain. The next year (209 B.C.) Scipio totally defeated Hasdrubal, Hannibal's brother, and subsequently a fresh army, led by Mago and Hasdrubal the son of Gisco. The result was to drive the Carthaginians wholly from Spain, and Scipio was empowered to lead an army against Carthage herself. The Carthaginians recalled Hannibal from Italy to Africa, where the great battle of Zama, fought October 19, 202 B.C., resulted in the total defeat of the Carthaginians, who, on the advice of Hannibal, sought for peace. On his return to Rome Scipio was honored with a triumph, and received the surname of *Africanus*. After this he discharged, in a praiseworthy manner, the office of censor; but lost the favor alike of the old Roman party and the new. After the successful close of the war with Antiochus, king of Syria, in B.C. 189, Scipio retired into private life. He was not long permitted to rest, however, without experiencing the enmity of a party in the state who were hostile to him. First his brother Lucius was imprisoned and his property confiscated, on an alleged charge of misconduct in his dealings with Antiochus. This was followed up by charges brought against Scipio himself. When his trial came on he made no reply to these charges, but merely narrated all that he had done for the republic, and reminding them that this was the anniversary of the battle of Zama, called upon the people to follow him to the Capitol, there to return thanks to the immortal gods, and pray that they would grant the Roman state other citizens like himself. The people immediately followed him, leaving the accusers alone in the forum. Scipio immediately quitted Rome, and retired to his villa at Liternum, where he died, it is believed, in B.C. 183, the same year as his great opponent Hannibal.

Scip'io Africa'nus, THE YOUNGER, PUBLIUS CORNELIUS SCIPIO ÆMILIANUS AFRICANUS MINOR, son of L. Æmilius Paullus, the conqueror of Macedonia, and adopted son of P. Cornelius Scipio, the son of Scipio Africanus Major, was born about 187 B.C. in B.C. 152 he accompanied the consul Lucius Licinius Lucullus to Spain as military tribune, and in B.C. 149, on the outbreak of the third Punic war, commanded in Africa under the consul M. Manlius Nepos. His services were so important that in B.C. 147, contrary to the usual custom, not being of the legal age, he was unanimously chosen consul and leader of the forces against the Carthaginians. In B.C. 146 he took, and by command of the senate burned Carthage, for which he was honored with a triumph at Rome and with the surname of *Africanus*. In B.C. 142 he was elected censor, and in B.C. 134 entered on his second consulship, in order to put an end to the war with Numantia in Spain. For his conquest of this powerful city a triumph was decreed to Scipio, and he received the surname of *Numantīnus*. In the last years of his life he made himself many enemies among the people by opposing the measures of the popular party, and especially the agrarian law of Tiberius Gracchus, of which Papirius Carbo, and Caius Gracchus, the tribunes of the people, were the great supporters. He was found dead in his bed in B.C. 129, Carbo being suspected of having murdered him. He was a friend of Polybius, the historian, and a patron of Terence.

Scire facias (sī'rē fā'si-as; Lat. 'cause him to know'), a judicial writ to enforce the execution of judgments, etc., directed against a person who is called upon to show cause why something should not be done on behalf of the party in whose interest the writ is issued. The writ is now of little practical importance.

Scirpus. See *Bulrush*.

Scirrhus (skir'us), or HARD CANCER, is the most frequent variety of cancer. It has its seat sometimes in the stomach, rectum, and elsewhere; but by far most frequently it attacks the female breast. If detected in time it can be removed from the breast with every prospect of success.

Scissor-bill (*Rhynchops nigra*), a genus of Laridæ or gulls, so named from the possession of an elongated beak of compressed form, the lower mandible exceeding the upper one in length, and shutting into the latter somewhat after the fashion that the blade of a knife does into its handle. This curious beak is of an orange color at its base, and black at its tip. The bird, which inhabits the coasts of America and Africa, is a dark brown on the upper aspect of the head and body; the under surface white, and a band of white across the wings. The average length of the scissor-bill is about 1½ foot.

Sclavonia. See *Slavonia.*

Sclerodermic and Sclerobasic Coral, the two great varieties of corallum, or coral substance (see *Coral*) secreted by the Actinozoa, or highest group of cœlenterate organisms.

Sclerotic Coat. See *Eye.*

Scolecida (sko-le'si-da), Huxley's name for a provisional class of annuloids, comprising the *Platyelmia*, or flat-worms; *Nematelmia*, or round-worms; and *Rotifera*, or wheel-animalcules. The Platyelmia include the orders *Tæniada* (tape-worms), *Trematoda*, or flukes, and *Turbellaria* (non-parasitic forms such as Planaria and Nemertidans); the Nematelmia are represented by the orders *Acanthocephala* (thorn-headed worms), *Gordiacea*, or hair-worms, and *Nematoda*, or round-worms. The Rotifera are non-parasitic, free organisms, which differ in many respects from the rest of the Scolecida. The Scolecida are characterized by the possession of a water-vascular system, consisting of a remarkable set of vessels which communicate with the exterior by one or more apertures situated upon the surface of the body, and branch out, more or less extensively, into its substance. The nervous system (when present) consists of one or two closely approximated ganglia.

Scolopacidæ (sko-lo-pas'i-dē), the family of birds to which the snipe and woodcock belong.

Scolopendra. See *Centipede* and *Myriapoda.*

Scolopendrium. See *Hart's-tongue.*

Scomber. See *Mackerel.*

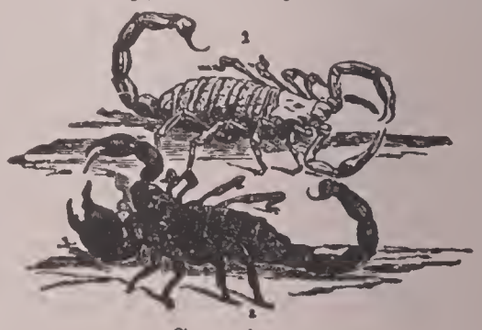
Scone (skön), New, a village of Scotland, 2 miles N. E. of Perth, on the Tay. The village of New Scone contains 1585 inhabitants. Of Old Scone the principal remains are a market-cross. Its ancient abbey, in which the kings of Scotland were wont to be crowned on the stone of destiny, now in Westminster Abbey, is only represented by inconsiderable ruins.

Scopas (skō'pas), an eminent sculptor and architect of ancient Greece, belonging to the island of Paros, flourished about 390-350 B.C., a contemporary of Praxiteles. He was really a cosmopolitan artist in the Grecian States.

Score (skōr), in music, the original draught, or its transcript, of a musical composition, with the parts for all the different voices or instruments arranged and placed in juxtaposition: so-called from the practice of drawing the bar through all the parts.

Scoresby (skōrz'bi), William, an Arctic navigator, born at Cropton, Yorkshire, in 1789. He made his first voyages with his father, a daring and successful commander in connection with the northern whale-fishery. During the winter months when the vessel was in port, he attended classes in Edinburgh University. On the resignation of his father in 1811 he was appointed to succeed him as captain of the *Resolution*. Through information communicated by him to Sir Joseph Banks, the government was induced in 1817 to fit out an expedition under Sir John Ross to discover the northwest passage. In 1820 Captain Scoresby published a work entitled *An Account of the Arctic Regions*, with a *History and Description of the Northern Whale-fishery*, which established his reputation as one of the most original observers and scientific navigators of the day. It was followed in 1823 by a *Journal of a Voyage to the Northern Whale-fishery, including Researches and Discoveries on the Eastern Coast of West Greenland.* About the same time he quitted the whale-fishing. In 1824 he was elected a fellow of the Royal Society. He afterwards entered the ministry, and filled several pastorates, dying March 21, 1857. Throughout his life he had a keen interest in scientific investigation, especially in that of magnetism and its relation to navigation. Various treatises were published by him, afterwards collected under the title of *Magnetical Investigations.* He also published *The Franklin Expedition*, and other works.

Scorpion (skor'pi-un), the name of animals of the class Arachnida (which includes also the spiders) — order Arthrogastra or Pedipalpi, the largest of their class. Scorpions have an elongated body, suddenly terminated by a



Scorpions.
1, *Buthus occitanus.* 2, *Scorpio Cæsar.*

long slender tail formed of six joints, the last of which terminates in an arcuated and very acute sting, which effuses a venomous liquid. This sting gives rise to excruciating pain, but is usually unat-

tended either with redness or swelling, except in the glands of the arm-pit or groin. It is very seldom, if ever, fatal to man. The animal has four pairs of limbs borne by the thorax or chest-segments, and the maxillary palpi (organs of touch belonging to the maxillæ or lesser jaws) are largely developed, and constitute a formidable pair of nipping claws. With these claws they seize their insect prey, which is afterwards killed by the sting. The eyes, which are of the simple kind, number six, eight, or twelve. The female scorpions are said to exhibit great care for their young, and carry them on their backs for several days after being hatched, while they tend them carefully for about a mouth, when they are able to shift for themselves. Scorpions generally live in dark places, and under stones. They are found in the south of Europe, in Africa, in the East Indies, and in South America, several genera (*Androctonus*, etc.) being comprised within the order. The *Buthus afer*, or rock scorpion (which see) of Africa, is one of the most familiar species. The scorpions are first represented in a fossil state in the carboniferous period. The book scorpions (Cheliferidæ), of which a common species is the *Chelifer Widcri*, are so-named from their presenting a close resemblance in outward form to the true scorpions. The book scorpions are, however, much smaller, and are included in another group (*Trachearia*) of the class Arachnida, while they want the jointed tail of the true scorpions. They are generally found living among old books, and feed on the minute insects which also inhabit such situations.

Scorpion-fish, or SEA-SCORPION (*Scorpæna*), a genus or teleostean (acanthopterous) fishes, belonging to the Triglidæ or gurnard family. The first dorsal fin possesses eleven spines, the second dorsal possessing one spiny ray and nine or ten soft rays. The anal fin is short, and has three spines and five soft rays. The red scorpion-fish (*Scorpæna scrofa*) is a familiar form. The spotted scorpion-fish (*S. porcus*), a second species, occurs in the Mediterranean, the Atlantic, and the tropical seas.

Scorpion-fly (*Panorpa*), a genus of insects belonging to the order Neuroptera, or that of the dragonflies. The name scorpion-fly is derived from the appendages seen attached to the abdomen of some species. The male in the common species, for example, has the sixth and seventh joints of the abdomen attenuated, and capable of extensive motion; while the last joint forms a pair of forceps resembling those of the earwigs. When at rest this tail is curled over the back, but when irritated the forceps are used as weapons of offense or defense.

Scorpion-shell, the name given to the shells of certain gasteropodous molluscs, belonging to the family Strombidæ, from the projecting spines with which the shells are provided. These shells are also known by the name of 'spider-shells' for the same reason. They are chiefly found in the Indian and Chinese seas.

Scorzonera (skor-zō-ne'ra), a genus of plants of the nat. order Compositæ, suborder Chicoraceæ, with yellow and occasionally rose-colored flowers. The species, which are numerous, are chiefly indigenous to Southern Europe and the East. The common scorzonera (*S. Hispanica*), a native of Spain and the south of Europe, has long been cultivated in English kitchen-gardens for its edible roots, which are carrot-shaped, but small and dark-colored, though pure white within. They possess cooling and antifebrile properties, and are said to be often highly beneficial in cases of indigestion or biliousness. The name viper's grass is sometimes given to this plant, either from the shape of the root, or from its supposed properties of curing snake-bites. *S. dcliciosa* is a species much cultivated as an esculent at Palermo.

Scot (skot), REGINALD or REYNOLD, one of the first and boldest writers against the belief in witchcraft, alchemy, astrology, and other prevalent superstitions of his time, a younger son of Sir John Scot of Scotshall, in Kent; born in the early part of the sixteenth century. He studied at Oxford, and spent his life in the study of old and obscure mystical authors, and the pleasures of gardening, until his death in 1599. The work on which his reputation is founded is entitled *The Discoverie of Witchcraft*, and was published in 1584. By order of James I the first edition of the book was burned by the common hangman, and the king replied to it in his *Demonology*. Refutations were also published by Meric Casaubon, Joseph Glanvil, and others.

Scot and Lot, an old legal phrase applied originally to the payment of parish assessment according to ability. In certain English boroughs persons paying such assessments voted for members of Parliament.

Scoter (skō'ter), or SURF DUCK (*Oidcmia*), a genus of sea-ducks. The most familiar species is the

common or black scoter (*O. nigra*), which shows a deep black plumage in the male, the bill and legs being of the same color. The upper mandible is marked on its dorsal surface by a line of orange color. This bird averages the common duck in size; and the females are colored of a dark-brown hue. It occurs in the Arctic regions in summer. An American species of coot is known as surf-duck.

Scotists. See *Duns*, *John*, and *Scholasticism*.

Scotland (skot'land), the northern division of the Island of Great Britain, between lat. 54° 38′ and 58° 40′ 30″ N.; and lon. 1° 46′ and 6° 8′ 30″ W. It is separated from England substantially by the Solway, the Cheviot hills, and the Tweed, the border isthmus being about 60 miles across; though the irregular boundary line measures fully 100 miles. On all other sides it is bounded by the sea. The greatest length, from N. N. E. to S. S. W., between Dunnet Head and the Mull of Galloway, is 287 miles. The breadth varies from 140 miles to less than 30, the latter in the north, between Dornoch Firth and Loch Broom. Few points in the mainland are more than 40 miles from the sea, the country being so much penetrated by inlets. The country was formerly divided into a number of districts, many of the names of which are still familiar, such as Lothian, Tweeddale, Galloway, Breadalbane, etc., but for political purposes it is now divided into thirty-three shires or counties. The population in 1911 was 4,760,-904; in 1921, 4,882,157. The largest city is Glasgow (1,034,069). Edinburgh, the capital, has a population of 420,267; Dundee, 168,217; Aberdeen, 158,969. Other cities with a population over 40,000 are Paisley, Greenock, Motherwell and Wishaw, Clydebank and Coatbridge.

Islands and Coasts.— The islands of Scotland are said to number altogether nearly 800. On the northeast are the two large groups of the Orkneys and Shetlands, and on the west coast the islands are large and numerous, including the Hebrides, which extend for 200 miles from north to south. The west coast of the mainland is generally a wild, deeply-indented mountain-wall, presenting a series of inlets or sea lochs, while towards the middle the coast is cleft by two great inlets with openings to the southwest, the Firth of Lorn and its continuation Loch Linnhe, and the Firth of Clyde and its ramifications running far inland. The east coast is sometimes low and sandy, but is often formed of steep rocky cliffs of considerable elevation, the chief inlets being the Firths of Forth and Tay, and the Moray Firth, Cromarty Firth, etc.

Surface.— Both from the configuration of the surface and the geological structure the country divides into three divisions, the Highlands, Central Lowlands, and Southern Uplands. The Highland division is remarkable for the number and elevation of its mountain-masses, many of the summits being over 4000 feet high. The mountains best known by name are the Grampians, which form a system or series of masses covering a large area, and culminating on the west coast in Ben Nevis, 4406 feet high. The Grampians and their connections are separated from the mountains farther to the north by Glenmore or the Great Glen of Scotland, a remarkable depression stretching quite across the country from sea to sea, and forming, by the series of lakes occupying it and the Caledonian Canal connecting them, a waterway from the west coast to the east. The Southern Uplands are also essentially a mountainous region, summits of over 2000 feet being frequent, though none exceed 3000 feet above the sea. The central region, though much less elevated than the other two divisions, has none of the monotony usual in flat countries. Though occupying not more than a sixth of the whole surface, the fertility of the soil and its mineral treasures make this part by far the wealthiest and most populous.

Rivers and Lakes.— The chief rivers flow (roughly speaking) to the east, and enter the German Ocean, the largest being the Tweed, Forth, Tay, South Esk, North Esk, Dee, Don, Deveron, Spey, Findhorn, etc.; those entering the sea on the west are the Clyde, Ayr, Doon, Dee, Nith, Annan, and Esk. The Tay carries to the sea a larger quantity of water than any river in Britain, but neither it nor most of the others, except when they form estuaries, are of much use for navigation. The Clyde, however, in its lower course carries a vast traffic, this being rendered possible chiefly by dredging. Many of the rivers are valuable from the numbers of salmon they produce. A striking feature of the country is the great multitude of lakes, varying in size from Loch Lomond (28 square miles) to the pool-like mountain tarns. In the Northern Highlands almost every glen has its lake and every mountain hollow is filled by a stream or spring.

Geology.— As regards geology the older or palæozoic rocks predominate almost everywhere in Scotland. The Highlands are composed almost entirely of crystalline schists, gneiss, and quartzites; the Cen-

tral Lowlands of old red sandstone, carboniferous and Permian strata; the Southern Uplands mostly of rocks of Silurian age. In certain localities remains of secondary formations are represented over small spaces, while volcanic rocks cover considerable areas. Granite exists in great masses in many localities, and in some parts is extensively quarried. The most valuable mineral region is the Central Lowlands, where coal and iron exist in such quantity as to make this one of the most important mineral fields of Great Britain.

For *Agriculture, Manufactures, Trade,* etc., see *Britain.*

Agriculture and Manufactures.— The climate in the w. and s. is mild but humid; in the central elevated regions, chilly and humid; in the eastern plains and Lowlands, more genial. In the Lowlands the summer is not so warm as that of England, but the winter, on the whole, is milder and the climate is salubrious. But agriculture does not flourish in Scotland generally, on account of the rugged character of its surface, only about one-fourth of it being under cultivation. The principal cereals are oats and barley, little wheat being grown. Potatoes, turnips and beans are largely cultivated, and sheep-raising is a leading feature of rural industry. The leading minerals are coal, iron, and oil-shales, coal being much the largest in yield. The fisheries are a great source of wealth to the Scottish people, the surrounding seas teeming with herring, haddock, cod and other fish, while salmon frequent the rivers. Manufacturing industries have greatly developed within recent times, Scotland having become one of the important manufacturing countries of Europe. The most important of its industries are those of textiles and iron and steel products. The Clyde leads in the shipbuilding industry of the world, there are great iron-works in Glasgow and some other cities, while cotton is largely manufactured in Glasgow, linen and jute in Dundee, and cotton-thread in Paisley. Other large industries are distilleries, breweries, and chemicals. Edinburgh, the capital, is one of the leading publishing centers of the world. The principal seaports are Glasgow (the second city in size in the British empire), Dundee, Aberdeen and Greenock.

Civil History.— The country now called Scotland first became known during the Roman occupation of Britain, though for many centuries little is known of its history. It is supposed that the earliest inhabitants of the country were a race resembling the Iberians, and typified now by the Basques. A Celtic people seem subsequently to have entered the country, and to have gained predominance. The descendants of the Caledonians, as the people north of the Forth and Clyde were called by the Romans, were afterwards called Picts, and were the predominant people in North Britain at the beginning of the sixth century, when a colony of Scots or Dalriads from Ireland effected a settlement in Argyle, and gradually spread over the adjacent regions. It is from these Scots (a Celtic and Gælic-speaking people) that the country afterwards received the name of Scotland, the original Scotland (Scotia) being Ireland. The Teutonic element was introduced into Scotland as early as the fourth century, when bands from North Germany seem to have formed settlements on the east coast south of the Firth of Forth; and this part of the country was subsequently united to the Anglian kingdom of Northumbria, which extended from the Forth to the Humber. To the west of this kingdom, from Dumbarton to the Solway and into England, extended the kingdom of Strathclyde or Cumbria, inhabited by Romanized Britons.

About the middle of the ninth century Kenneth MacAlpin, a chief of both Scot and Pict descent, founded a kingdom comprising Central Scotland, with Scone as capital, the north of Scotland being mostly under independent chiefs. or maormors. The reigns of Kenneth and his immediate successors, Donald I, Constantine I, Grig, Donald II, Constantine II, Malcolm I, Kenneth II, Malcolm II, Duncan and Macbeth, were one continued scene of warfare with the Norsemen on one hand and with the Britons of Strathclyde and the English of Northumbria on the other. Malcolm I (943-954) obtained Cumbria (Strathclyde) as a territorial fief from Edmund I, and in 1018 his grandson, Edmund II, secured Lothian, hitherto part of Northumberbria, two events which materially influenced the after-history of Scotland.

On the advent of Malcolm Canmore (1058) to the throne after the death of Macbeth, the able usurper and murderer of Duncan (see *Macbeth*), the purely Celtic monarchy came to an end. Malcolm's mother, the wife of Duncan, was an Anglo-Dane, sister of Earl Siward of Northumbria, and his youth had been spent at the court of Edward the Confessor. The conquest of England by William of Normandy involved Malcolm in many a serious struggle. Edgar Atheling, the heir of the English line, and many of the English nobles, sought and found refuge in Scotland. Malcolm mar-

ried Margaret, the sister of the fugitive prince, who is said to have introduced into her court a degree of refinement remarkable for that time. The Scotch king twice invaded England with success, but William, having collected a large army, in his turn advanced into Scotland, and compelled Malcolm to do homage for those lands which he held within what was accounted the English territory. Malcolm Canmore and his eldest son were slain in attempting to take Alnwick Castle in 1093, and Margaret survived only a few days.

On the death of Malcolm the Celtic tribes placed his brother Donald Bane on the throne, but he was driven from it before he had reigned a year by Duncan, a natural son of the late king, who now seized the scepter. In 1098, however, Edgar Atheling obtained a force from the English king, and succeeded in gaining the kingdom for Edgar, the lawful son of Malcolm. Edgar was succeeded by his brother Alexander I, a prince whose reign is chiefly signalized by his severe administration of justice. He assisted Henry I of England, who had married his sister, in a war with the Welsh, and died in 1124, leaving the throne to his younger brother David. On the accession of the usurper Stephen to the English throne in 1135, to the prejudice of Maud or Matilda, wife of the Emperor Henry V, only child of Henry I and niece of David, the latter made several expeditions into England in support of his niece's claim to the throne, during which he suffered an indecisive defeat near Northallerton (Battle of the Standard, 1137). He acquired a great reputation for sanctity, having founded several new abbeys, including those of Holyrood and Melrose, and reorganized most of the Scotch bishoprics. His services to the church procured him canonization, but his endowments so taxed the royal resources that he was bitterly characterized by James VI as a 'sair sanct for the crown.' His death in 1153 was preceded by that of his only son, so he was succeeded by his grandson, Malcolm the Maiden, whose reign of twelve years is only remarkable for his giving up Northumberland and Cumberland to the English king.

On the death of Malcolm IV in 1165 the crown fell to his younger brother William, who is known by the title of William the Lion. During an expedition into England for the purpose of regaining Northumberland he was taken prisoner (1175), and sent to Falaise in Normandy, where a treaty was concluded acknowledging the supremacy of England, and declaring Scotland a fief and himself a vassal of the English crown. This treaty remained in force till 1189, when Richard I restored Scottish independence for the sum of 10,000 marks in order to equip a force to join the third crusade. The rest of William's reign was devoted to the consolidation of his kingdom in the north and west. The Scotch alliance with France, and many of the Scottish burgh charters, date from this reign.

His son and successor, Alexander II (1214-49), a youth in his seventeenth year, took the side of the English barons in their struggle with King John, in the hope of recovering the Northumbrian and Anglo-Cumbrian provinces. After much blood had been shed, and the border lands repeatedly devastated, Henry III agreed in 1237 to give the King of Scots certain manors in Cumberland and Northumberland, not in sovereignty, but in feudal property. This was accepted, and a border line was laid down which has never since been altered to any considerable extent.

Alexander III (1249-1286) succeeded in the eighth year of his age. One of the chief events of his reign was the war that broke out with Haco of Norway for the possession of the Western Islands, which ended in the victory of the Scots at Largs (1263), and the consequent cession of the Isles to Scotland (1263). In 1284 the king was left childless, and a meeting of the Estates at Scone settled the crown on his granddaughter Margaret, who succeeded on his death in 1286. She was then only three years old, and a regency was established consisting of four barons and two bishops. Edward I, desirous of joining the two countries in one kingdom, proposed that a marriage should take place between the young queen and his son (afterwards Edward II). This was agreed to by a treaty signed at Brigham near Roxburgh, which made strict provision for the independence of Scotland. The scheme, however, was frustrated by the death of Margaret in one of the Orkneys when on her way to Scotland (Sept. 1290). Now a host of rival claimants for the throne appeared, all of whom ultimately gave way to three descendants of David, earl of Huntingdon, brother of William the Lion. John Baliol claimed as grandson of David's eldest daughter, Robert Bruce as son of David's second daughter, and David de Hastings as grandson of the third daughter. Edward I being asked to settle the dispute decided in favor of Baliol, who was crowned at Scone (1292), acknowledging Edward as his overlord

On the outbreak of war between England and France the weak monarch was compelled by his nobles to enter into an offensive and defensive alliance with France, and formally to renounce his allegiance to Edward (1296). Edward immediately invaded Scotland, stormed and took Berwick, and reduced the fortresses of Dunbar, Roxburgh, Edinburgh, and Stirling. Baliol surrendered in the neighborhood of Brechin, and Edward after marching north, probably as far as Elgin, returned to Berwick to receive the homage of the Scotch bishops, barons, and knights. Baliol himself was committed to the Tower of London. Scotland was now occupied by English garrisons and placed under English officials; and Edward seemed to have entirely accomplished his cherished purpose, when a rebellion against his usurpation broke out.

William Wallace, younger son of Sir Malcolm Wallace of Elderslie, first came forward in a private quarrel with Haselrig, an English governor of Lanark, which developed into a successful rebellion in the southwest and center of Scotland. Assisted by some of the barons and a considerable body of men, he defeated the English governor, the Earl of Surrey, at Stirling Bridge (September 11, 1297), drove Edward's garrisons out of the country, and made a raid into England. He assumed the title of Guardian of Scotland in the name of Baliol, and directed his energies to rectify the abuses and disorders of the country, and to revive the trade with the free towns of the Continent. Edward, who was in Flanders, hastened home, and marching at the head of a large army, defeated Wallace at Falkirk (July 22, 1298), and before 1303 had repossessed himself of the whole country. In 1305 Wallace was betrayed into the hands of the English near Glasgow by Sir John Menteith; was carried to London, and after a mock trial was condemned as a rebel and traitor to Edward and executed (August 23, 1305).

Wallace soon had a more fortunate successor in Robert de Bruce, earl of Carrick, grandson of that Bruce, lord of Annandale, who had been Baliol's rival in the dispute concerning the Scottish crown. He had long been an unwilling and restless retainer of Edward, but finally determined to push his claims in Scotland, and was crowned as king of the country at Scone in 1306. At first his career was not successful, but the death of Edward I at Burgh-on-Sands, on his way to Scotland, and the inactivity of his son Edward II, were turning points in the recovery of the independence of Scotland. Graudally Bruce recovered the whole country, till in 1313 the only English garrison left was Stirling Castle, which was closely besieged by the Scotch. To relieve it Edward II led into Scotland a great army, which was totally defeated by Bruce in the decisive battle of Bannockburn (June 24, 1314). After this victory Bruce reigned with almost uninterrupted success, and died in 1329.

On the death of Robert Bruce his son, David II, a boy six years old, was proclaimed king, and acknowledged by the great part of the nation. Edward Baliol, however, the son of John Baliol (who died 1314) formed a party for the purpose of supporting his pretensions to the crown; he was backed by Edward III of England. At first Baliol was successful; and on September 24, 1332, he was crowned king at Scone, but eventually David succeeded in driving him from the kingdom. Still, however, the war was carried on with England with increased rancor till at length David was made prisoner at the battle of Neville's Cross, near Durham (October 7, 1346). After being detained in captivity for eleven years he was ransomed for 100,000 merks, an old Scottish coin worth about 27 cents.

At his death in 1370, childless, the succession fell to Robert, son of Walter, the high steward, and of Marjory Bruce, daughter of Robert I (Bruce), Robert II being thus the first of the Steward, or, as it came to be written, Stewart or Stuart, dynasty. He concluded a treaty with France, in which the nations mutually stipulated to assist and defend each other. His reign was on the whole peaceful, though the usual border raids between Scotland and England continued; the chief ending in the celebrated fight of Otterbourne or Chevy Chase. Robert II died in 1390, and was succeeded by his son, John, who upon his accession took the name of Robert III. Scotland at this time was rent by the dissensions of its powerful barons and the feuds of hostile clans, and Robert was of too weak and indolent a character to cope with the turbulent spirits of the age. An invasion of Henry IV in 1400 effected nothing. In 1402 the Scots sent an army under Douglas to make reprisals on England, but they were met by the English under Percy at Homildon Hill and completely routed. The latter part of the reign of Robert III was disturbed by the ambition of his brother, the Duke of Albany, who is said to have caused the death of the profligate young Duke of Rothesay, the heir to the throne. Afraid for the safety of his second son, James,

Robert designed to send him to France; but the ship in which he was being conveyed was captured by the English, a misfortune which is thought to have had a great effect in hastening the king's death (1406).

James I being then only eleven years of age, and a captive, the regency devolved on the Duke of Albany. The kingdom was torn with internal strife. Several of the more powerful nobles were conciliated by grants of land; but Donald, lord of the Isles, the most powerful Highland chief, marched into Aberdeenshire with a great host, and threatened to overrun lowland Scotland. He was totally defeated at Harlaw by a much inferior force (July 24, 1411), and the country was saved from this danger. The excellent education bestowed on James in England in some measure compensated for the injustice of his capture and detention. In England also he obtained a wife, namely Joanna Beaufort, daughter of the Earl of Somerset and niece of King Henry V. Their marriage facilitated the negotiations for his release, and after nineteen years of captivity he and his bride were crowned at Scone (1423). On his return the regent Murdoch of Albany was put to death, reforms in the constitution of parliament and in the statute-law effected, lawlessness put down, and the connection between Scotland and France strengthened. James's efforts to diminish the power of the great nobles provoked a conspiracy against him, and he was murdered in the Blackfriars' Monastery at Perth (February 20, 1437). In this reign the University of St. Andrews was founded (1411).

His son and successor, James II, being only seven years of age, the country was subjected to the miseries of a long and feeble regency. One of the chief events of his reign was the rebellion and temporary overthrow of the powerful house of Douglas. James was accidentally killed by the bursting of a cannon at the siege of Roxburgh Castle (August 3, 1460). James III was not quite eight years of age when he succeeded to the kingdom, which was again subject to all the troubles of a minority. In 1467 the young king married Margaret, daughter of the Norse king Christian, and in the shape of a pledge of payment of her dowry the Orkney and Shetland Islands were given up to Scotland, of which they have ever since formed a part. James seems to have been a man of culture, but weak of will and partial to favorites. A confederation against him was formed by a number of his nobles in 1488; the forces met at Sauchieburn, near Stirling, where the royal army was defeated, and James was murdered in the flight.

James IV, who had been induced to join the nobles hostile to his father, was sixteen years old when he ascended the throne. In 1503 he married Margaret, daughter of Henry VII of England, and thus paved the way for the future union of the two kingdoms. During the early part of the reign of Henry VIII James was induced to espouse the French cause and to invade England. This disastrous campaign ended in the total destruction of his splendid army, his own death and that of most of the nobles who accompanied him, at Flodden Field (September 9, 1513).

The king's death plunged the nation into a state of anarchy; his infant successor, James V, had not yet reached the age of two years. His cousin, the Duke of Albany, was appointed regent, but from an early part of the reign James was almost entirely in the hands of the Earl of Angus, who had married the queen dowager, and had almost complete control of affairs till 1528, when James, then in his seventeenth year, managed to escape to Stirling, take the government into his own hands, and drive Angus into England. His alliance was sought by England, France, and Spain, and in 1537 James married Madeleine, daughter of Francis I. The young queen died a few weeks after her arrival in Scotland. And in the following year James married Mary of Lorraine, daughter of the Duke of Guise. His refusal to throw off his allegiance to Rome at the request of Henry VIII of England led to a declaration of war on the part of the latter and the defeat of the Scots at Solway Moss, in 1542. A few days afterwards James died, having just received tidings of the birth of his daughter, the future Mary Queen of Scots.

The eventful period which followed the accession of Mary was dominated by the Reformation movement, and the questions affecting the Union of Scotland and England. A scheme to affiance the young queen to Edward, son of Henry VIII, was defeated by a party of the nobles getting possession of the queen, and renewing the old league with France. The consequence was war with England, when the whole of the southeast of the country was devastated, and the Scottish army defeated at Pinkie (1547). In the following year Mary was sent to France, her mother filling the regency. In 1558 she was married to the dauphin, who succeeded to the throne the following year, but died in 1560. Mary then returned to Scotland, where she found the

nobility divided into two parties, the Roman Catholics, headed by Huntley, and the Reformed party, headed by her half-brother, Lord James Stewart, afterwards Earl of Maroy or Murray. The result was a series of disturbances between the opposing parties, but Mary's reign was popular up till her unfortunate marriage with Darnley in 1565. Moray, who opposed the marriage, had to fly, and was henceforward her enemy. The marriage was unhappy. Darnley was murdered by the Earl of Bothwell and his servants, but whether Mary was accessory to the murder is yet a matter of controversy. Yet she married Bothwell within three months, and alienated the greater number of her subjects. A confederacy was formed against her, and after a vain show of resistance at Carberry Hill she surrendered, and was imprisoned in Lochleven Castle, where she was forced to abdicate in favor of her infant son, and commit the regency to Moray (1567). In May next year she escaped, and raised an army, which was met by Moray and the Protestant nobles at Langside, near Glasgow, and was defeated. Flying to England Mary put herself under the protection of Elizabeth. Here she drops from Scottish history, but her after-life till her execution in 1587 was a continual series of plots to regain her lost throne.

James VI, the son of Mary, being a mere child, Moray held the regency of the kingdom, conducting its affairs with a wise and firm hand, till February 26, 1570, when he was shot in the streets of Linlithgow by Hamilton of Bothwellhaugh. His death was followed by a succession of regents — Lennox, Mar, and Morton — by great disorders in the kingdom, and a war between the parties of the king and queen. On the death of Elizabeth, in 1603, James succeeded as the nearest heir to the English throne through his descent from Margaret, daughter of Henry VII and wife of James IV. He was crowned at Westminster, and assumed the title of King of Great Britain, France, and Ireland.

There were seven Scottish Parliaments called by James after his accession, wherein he was represented by a commissioner sitting as president. His chief energies were directed to an attempt to draw England and Scotland into a closer union by means of harmonizing the laws of the two countries, and by establishing episcopacy in Scotland. In furtherance of the latter object he visited Scotland in 1617 for the only time after the union of the crowns. There were many acts passed for promoting trade and commerce, and the nation about this time seems to have been inflamed with a mania for colonization, as many thousands of the inhabitants left their native land for the Irish province of Ulster, or the more distant shores of Nova Scotia. James VI died in 1625, and was succeeded by his son, Charles I, then in the twenty-fifth year of his age.

Foreign wars and domestic troubles prevented Charles from visiting Scotland till 1633, when he was crowned at Edinburgh. The church was now entirely governed by the bishops, and civil affairs managed by the privy-council. At the outbreak of the civil war in England, Scotland took the part of the parliament against the king, the Solemn League and Covenant being entered into between the Scottish Presbyterians and the English parliament (1643). A Scottish army entered England under Alexander Leslie, earl of Leven, and was of considerable assistance to the parliamentary forces at Marston Moor and elsewhere. Meanwhile Montrose overran the country with his wild Highland and Irish army, till his career was cut short by General David Leslie at Philiphaugh in 1645. The affairs of the king becoming hopeless in England, Charles gave himself up to the Scottish army posted before Newark May 5, 1646, and was surrendered to the English parliament January 30, 1647, on payment of the arrears of pay of the Scottish troops.

After the execution of Charles (Jan. 30, 1649) the Scots proclaimed his son king, under the title of Charles II. The young king was then in Holland, and certain commissioners were sent over from Scotland to inform him that the governing body were willing to espouse his cause if he should take the Covenant with its companion testimonies, and engage to do his utmost to enforce the whole Covenanting system over England and Ireland. This Charles agreed to do, and he was invited over to his northern kingdom. He arrived in Scotland, landing at the mouth of the Spey, July 3, 1650, and marched southwards by Aberdeen, Dundee, and St. Andrews to Falkland Palace. This royal progress alarmed the republican council of state at Whitehall, and a force under Cromwell was despatched to stop it. General David Leslie marched to meet Cromwell, but was defeated at Dunbar (September 3, 1650). Notwithstanding this defeat, Charles was crowned at Scone (January 1, 1651), and immediately marched into England. Cromwell followed, and at Worcester utterly scattered the royalist force, and compelled Charles to become a fugitive (September 3, 1651).

Cromwell returned to Scotland and in part reduced it, leaving Monk to complete the work. This was brought about by the sack of Dundee in 1653 and other severe measures. Cromwell's death was soon followed by the fall of his son, Monk's march to London at the head of the army, and the restoration of Charles II (1660).

The Scottish parliament assembled under the Earl of Middleton, the king's commissioner, January 1, 1661, and it soon became apparent that Charles was determined to carry out the favorite scheme of his father and grandfather, of establishing Episcopacy in Scotland. This endeavor to establish Episcopacy was violently opposed, and led to a cruel persecution, which lasted with more or less severity during the whole of the reign of Charles. Hundreds were executed on the scaffold, others were fined, imprisoned, and tortured; and whole tracts of the country were placed under a military despotism of the worst description. (See *Covenanters.*) In 1679 a body of royal troops under Graham of Claverhouse was defeated by a force of Covenanters at Drumclog. Six weeks later the Covenanters were defeated with terrible slaughter at Bothwell Bridge. Charles died in 1685, and was succeeded by his brother, James VII of Scotland and II of England. The chief events of his reign, so far as Scotland was concerned, were the rising, defeat, and execution of Argyle; the declarations of indulgence by which many of the Presbyterian ministers returned to their charges; and the continued persecution of the strict Covenanters, one of whose ministers, Renwick, the last of the Covenanting martyrs, was executed at Edinburgh in 1688.

At the Revolution a convention of the Estates at Edinburgh proclaimed William, prince of Orange, James's son-in-law and nephew, and his wife Mary, James' daughter, king and queen of Scotland. Claverhouse, now Viscount of Dundee, raised an army of Jacobites, but his death at Killiecrankie (1689) put an end to the rising. Religious freedom was again restored, and in 1690 a General Assembly of the Presbyterian church again met. The reign of William III was marked by two events which rendered him generally unpopular in Scotland and strengthened the cause of the Jacobites, as the party which still adhered to James II was called. These were the massacre of Glencoe (see *Glencoe, Massacre of*) and the unfortunate Darien expedition (see *Darien Scheme*), but the reign closed without any serious rising in Scotland, a fact much to the satisfaction of the nation.

The death of William III, in 1702, transferred the crowns of the two nations to Queen Anne, sister of Mary. In 1703 the parliament of Scotland issued a declaration which intimated a purpose, in case of the demise of the crown, to appoint a different sovereign from the English king, and the ill-feeling between the two countries grew so strong that English statesmen became convinced that an incorporating union was essential for the peace of the two countries. A joint-commission was appointed to draw up articles of union in 1706. The Scottish parliament met to consider the articles, which encountered a strong opposition, headed by the Duke of Hamilton, and strongly backed up by the bulk of the people. A majority of the parliament, however, carried the measure (January 16, 1707); it received the royal assent (March 4); and the Union took effect (May 1). The chief provisions of the Act of Union were: (1) That the two kingdoms should be united under the name of 'Great Britain'; (2) that the succession to the crown of the United Kingdom should be in the Electress Sophia of Hanover and her heirs, being Protestants; (3) that 16 Scottish peers and 45 Scottish members of the House of Commons should be elected to the one parliament sitting in London; (4) that the Established Presbyterian Church of Scotland should be maintained; (5) that Scotland should keep unchanged her own laws and customs relating to property and private rights, and also the Court of Session and other Scotch courts; (6) that all the rights of trade, free intercourse, and citizenship should be the same for Scotch and English subjects. Thenceforth the general history of Scotland may be said to be entirely identified with that of England. See *Britain.*

Language and Literature.— Down to the fifteenth century the term Scottish language meant the Gaelic or Celtic tongue; the language of Lowland Scotland being looked upon as English, which indeed it was and is — Northern English, with certain peculiarities of its own. The term Scottish came to be applied to it as possessing these peculiarities, and as having a somewhat distinctive literary use. This language has been divided into three periods. During the *early* period, extending to near the end of the fifteenth century, there was little difference between the language of Scotland and that of England north of the Humber. In the *middle* period, which

extended to the Union, it was influenced in a slight degree by the Gaelic, and in a more pronounced manner by French and Latin, consequent on the French alliance and the revival of learning. During the *modern* period the language, as used in popular poetry, etc., has been to a considerable extent affected by modern literary English, though the genuine vernacular may still be heard in many districts with dialectic peculiarities according to locality.

The *Sir Tristrem*, a metrical romance, doubtfully attributed to Thomas the Rhymer, is by some regarded as the earliest piece of Scottish literature, and is generally accounted the earliest specimen of romance poetry in Britain (end of the thirteenth century). But the first undoubted specimen of Scottish literature is *The Bruce* of Barbour (about 1375; see *Barbour*). Between 1420 and 1424 was written Wyntoun's *Oryginale Cronykil of Scotland*, and about 1460 Henry the Minstrel, commonly called Blind Harry, did for Wallace what Barbour had done for Bruce. Another of the poets of this early period is no less a personage than James I (1394-1437), author of the *King's Quhair*. *Christis Kirk of the Grene* and *Peblis to the Play*, long believed to have been productions of James, have to be attributed to some other early poet. Down to the middle of the sixteenth century four names stand out prominently, viz., Henryson, Dunbar, Gavin Douglas, and Sir David Lyndsay (which see). Minor poets of this period were Walter Kennedy, Sir John Rowll, Quintan Shaw, and Patrick Johnstone. In 1536 John Bellenden, archdeacon of Moray, published the *History and Croniklis of Scotland*, a translation of Boece's *Historia gentis Scotorum*, which was also versified by William Stewart, a descendant of the first earl of Buchan. The anonymous *Complaynt of Scotland* (1548) is of value as preserving the titles of several popular pieces of contemporary literature now lost, and as a piece of early prose. A century and a half now elapse without any eminent Scottish poet, the names that appear being of minor note. In the third period of the language, when it had become a provincial patois, the first notable name is that of Allan Ramsay (1686-1758), author of *The Gentle Shepherd*, and of numerous shorter pieces and songs. To this same age belongs also nearly the whole of that remarkable body of song known as the Jacobite minstrelsy. The Scottish ballads, ever since the publication of *Percy's Reliques*, have engaged much attention, and have been carefully collected and illustrated by Sir Walter Scott and other editors. The list of the more prominent successors of Ramsay is closed by the names of Fergusson, Burns, Hector Macneil, Scott, James Hogg, and Tannahill; while the vernacular prose writers may be said to be represented by John Galt, Hogg, Sir Walter Scott, George MacDonald, and others. For the Scotchmen who have won an honorable place in English literature see *England*, section Literature.

Scott, David, historical painter, born at Edinburgh in 1806; died in 1849. His father was a landscape engraver. In 1828 he exhibited his first picture, *The Hopes of Early Genius Dispelled by Death*. He subsequently studied abroad, and while at Rome painted one of his best works, *The Household Gods Destroyed*. Having returned to Edinburgh he continued the practice of his art, and became a regular contributor to the exhibitions of the Scottish Academy, producing *Vasco de Gama Encountering the Spirit of the Storm at the Cape; Queen Elizabeth at the Globe Theatre; Paracelsus Lecturing to His Students on the Elixir of Life; Duke of Gloucester Carried to Prison* (Scott's finest work); and many others.

Scott, Sir George Gilbert, architect, grandson of Thomas Scott, the biblical commentator, was born at Gawcott, near Buckingham, in 1811; died in 1878. His tastes drew him mainly to the study of Gothic architecture, and to him is due in a great measure its revival in Great Britain. He was very largely employed in the erection of new churches, colleges, and secular public buildings, prominent among them being the church of St. Nicholas at Hamburg, the first important specimen of the Gothic revival erected in Germany, and the spire of which is 478 feet high. Sir Gilbert was specially identified with the process termed 'restoration,' which he applied to many important minsters and churches, such as the cathedrals of Ely, Lichfield, Hereford, Ripon, Gloucester, Chester, St. David's, St. Asaph, Bangor, Salisbury, and St. Albans. In this connection he wrote a *Plea for the Faithful Restoration of our Ancient Churches* (1850); *Conservation of Ancient Architectural Monuments* (1864), etc. He was elected A.R.A. in 1852, and R.A. in 1860, and was knighted in 1872.

Scott, Sir Michael, a Scottish philosopher and reputed magician of the thirteenth century, of whose history nothing is certainly known, except that after his return from the Conti

nent he received the honor of knighthood from Alexander III, by whom he was confidentially employed, and that he died at an advanced age in 1291. He must have been a man of considerable learning for his time, and being addicted to the study of the occult sciences passed among his contemporaries for a magician, and as such is mentioned by Boccaccio and Dante. He is generally identified with a Sir Michael Scott, or Scot, of Balweary, in Fifeshire, but this is at least open to doubt.

Scott, Michael, author of *Tom Cringle's Log* and *The Cruise of the Midge*, was born at Glasgow in 1789, and was educated at the high school and university of his native city; resided in Jamaica, engaged in commerce and agriculture, 1806-22; and finally settled in Scotland. He died in 1835.

Scott, Robert Falcon, polar explorer, born at Outlands, Devonport, England, in 1868; entered the navy in 1882. Made commander in 1901, he commanded the National Antarctic Expedition of 1901-04; was promoted captain, and in 1910 commanded the British Antarctic Expedition, sent with the hope of completing the work of Captain Shackleton. He reached the pole on January 18, 1912, only to find that Amundsen had preceded him. He and the four of his men who accompanied him to the pole perished on the return trip.

Scott, Thomas, an English biblical commentator, was born in 1747. He was ordained in 1773; in 1781 he became curate of Olney; in 1785 he obtained the chaplainship of the Lock Chapel, near Hydepark Corner, London; and in 1801 he was appointed rector of Aston Sanford, in Buckinghamshire, where he died in 1821. He imbibed Calvinistic views, in the defense of which, both from the pulpit and the press, he greatly distinguished himself; but he is now remembered chiefly by his *Commentary*, or *Family Bible with Notes*, which has had a very large sale both in England and America.

Scott, Thomas Alexander, railroad manager, was born at Loudon, Pennsylvania, in 1834, and became connected with the Pennsylvania Railroad in 1850. He was made superintendent in 1858, vice-president in 1859, and in 1861 was put in charge of forwarding volunteers to the seat of war. He was commissioned colonel of volunteers in May, 1861, and put in command of all government railroads and telegraphs, and in August was appointed assistant secretary of war. He resigned this post in June, 1862, but entered the government service again in September, 1863, giving excellent service in the forwarding of troops. He was president of the Pennsylvania Railroad, 1876-80 and died May 21, 1881.

Scott, Sir Walter, Bart., poet and novelist, was born in Edinburgh, August 15, 1771. He was a younger son of Walter Scott, writer to the signet, by Anne, daughter of Dr. John Rutherford, professor of medicine in the University of Edinburgh, both connected with old Border families. Before he was two years old his right leg was attacked with weakness, which left him lame for life, and generally as a boy his health was not robust. He entered the high school of Edinburgh in 1779, and in October, 1783, he was matriculated at the University of Edinburgh, where he studied Latin under Professor Hill, Greek under Professor

Sir Walter Scott.

Dalzell, and logic under Professor Bruce; but neither at school nor at college did he manifest any special brilliance. He was not idle, however, being a voracious reader from his earliest years, especially in the fields of ballad literature, romance, and history, and he acquired a fair acquaintance with modern languages, French, Italian, and Spanish, and even with German, a knowledge which was in that day not common. At the age of sixteen he commenced in his father's office an apprenticeship to legal business, and in 1792 he was admitted a member of the Scottish bar (the Faculty of Advocates). In 1797 he married a Miss Charpentier, the daughter of a French refugee; in 1799 he was appointed sheriff of Selkirkshire, a situation to which an income of £300 was attached;

and in 1806 he became a principal clerk of the Court of Session, although by arrangement with his predecessor he did not receive the full emoluments of his office, about £1200, till the death of the latter in 1812. His first ventures in literature were a translation of Bürger's *Lenore*, and *Der wilde Jäger* ('The Wild Huntsman'), which he published in a small quarto volume in 1796; then followed the ballads of *Glenfinlas*, *The Eve of St. John*, and the *Gray Brother;* a translation of Goethe's *Goetz von Berlichingen* in 1799; the *Minstrelsy of the Scottish Border* in 1802-03 (3 vols.); and an edition of the old metrical romance of *Sir Tristrem* in 1804. In 1805 he became prominent as an original poet with the *Lay of the Last Minstrel*, an extended specimen of the ballad style, which fell upon the public as something entirely new, and at once became widely popular. In 1808 he published *Marmion*, another poetic romance which greatly increased his reputation; and in 1810 the *Lady of the Lake*, in which his poetical genius seems to have reached the acme of its powers. His subsequent poetical productions — *The Vision of Don Roderick* (1811), *Rokeby* (1812), *The Bridal of Triermain* (1813), *The Lord of the Isles* (1815), *Harold the Dauntless* (1817), *Halidon Hill* (1822), *The Auchindrane Tragedy* (1830), and *The Doom of Devorgoil* (1830) — did not attain the same success. On the decline of his popularity as a poet he turned his attention to the prose romance, for which the greater part of his early life had been a conscious or unconscious preparation. The appearance of *Waverley*, in 1814, forms an epoch in modern literature as well as in the life of Scott. This romance or novel was rapidly followed by numerous others, forming, from the name of the first, the series known as the Waverley Novels. The earlier of these were *Guy Mannering* (1815), *The Antiquary*, *The Black Dwarf*, *Old Mortality* (1816), *Rob Roy* (1817), *The Heart of Midlothian* (1818), *The Bride of Lammermoor*, *A Legend of Montrose*, and *Ivanhoe* (1819). These splendid works of fiction, which surprised and enchanted the world, it is held by most, mark the high tide of his genius, those which follow being placed on a somewhat lower level, although there are several, especially in the second period, up to 1825, in which no falling-off is perceptible. *Ivanhoe* was followed by *The Monastery*, *The Abbot* (1820), *Kenilworth*, *The Pirate* (1821), *The Fortunes of Nigel*, *Peveril of the Peak* (1822), *Quentin Durward*, *St. Ronan's Well* (1823), *Redgauntlet* (1824), *The Betrothed* and *The Talisman* (1825), *Woodstock* (1826), *The Chronicles of the Canongate*, *The Fair Maid of Perth* (1829), *Anne of Geierstein* (1829), *Count Robert of Paris* and *Castle Dangerous* (1831). The Waverley novels were all published anonymously, nor did Scott cease to be the 'Great Unknown' until 1827, although their authorship had long been an open secret to many. Meanwhile he performed an amount of miscellaneous literary work which would have been almost more than enough for any other man, and the mere enumeration of which would be tedious; he also attended to the duties of his offices as sheriff of Selkirkshire, and a clerk of the Court of Session. The desire of becoming an extensive landed proprietor, and of founding a family, was a passion which apparently glowed more warmly in his bosom than even the appetite for literary fame. This desire he began to gratify in 1811, when he purchased a small farm of about 100 acres, lying on the south bank of the Tweed, 3 miles above Melrose, upon which was a small and inconvenient farm-house. Such was the nucleus of the mansion and estate of Abbotsford. By degrees, as his resources increased, he added farm after farm to his domain, and reared his chateau turret after turret, till he had completed what a French tourist not unaptly terms 'a romance in stone and lime'; clothing meanwhile the hills behind, and embowering the lawns before, with flourishing woods of his own planting. It was here that he dispensed for a few years a splendid hospitality to the numerous visitors whom his fame drew from every part of the civilized world. In 1820, when he was made a baronet by George IV, who was a great admirer of his genius, he reached the zenith of his fame and outward prosperity. But this prosperity was founded on no solid basis, and the crash came in 1826, when Constable & Co., the Edinburgh publishers, were obliged to suspend payment, hopelessly involving Ballantyne & Co., with whom it then appeared Scott had been connected as a partner since 1805. The liabilities which were thus incurred by him amounted to £130,000. His humiliation was indescribable, but he met the trial with strength and dignity. Liberal offers of assistance were made to him, but he refused them all. 'Time and I against any two,' he said; and leaving Abbotsford and taking a lodging in Edinburgh, he worked like a galley-slave in order to clear off the debt

Within a few years he was able to pay his creditors £40,000, and to put things in such shape that soon after his death the whole debt was liquidated. Symptoms of gradual paralysis, a disease hereditary in his family, began to be manifested, and in the autumn of 1831 his physicians recommended a residence in Italy as a means of delaying the approaches of his illness. To this scheme he felt the strongest repugnance, as he feared he should die on a foreign soil; but by the intervention of friends he was prevailed upon to comply. He sailed in a government vessel from Portsmouth, landed at Naples, and afterwards proceeded to Rome, Tivoli, Albani, and Frascati. Feeling, however, that his strength was rapidly decaying, his desire to return to his native land became irrepressible, and he hurried home with a rapidity which in his state of health was highly injurious. He reached Abbotsford in July, 1832, and died there September 21, 1832. He was interred in his family burial aisle amid the ruins of Dryburgh Abbey. His life was written by his son-in-law, John Gibson Lockhart, a work which has taken the position of a classic.

Scott, WILLIAM BELL, brother of David Scott, the painter, and himself a painter, etcher, engraver, archæologist, and poet, was born at Edinburgh in 1811. He received his art training in Edinburgh and removed to London in 1836. In 1844, at the request of the Board of Trade, he established a school of art at Newcastle-on-Tyne, and was until 1885 art examiner under the Education Board. His published poems include: *Hades* (1838), *The Year of the World* (1846), *Poems by a Painter* (1854), *Ballads, etc.* (1875), and *Harvest Home* (1882). Other works are: *Antiquarian Gleanings; Lectures on Art; Albert Dürer, His Life and Works; The Little Masters; Life and Works of David Scott;* etc. He died in 1890.

Scott, WINFIELD, commander-in-chief of the United States army, was the son of a Scottish Jacobite, and was born near Petersburg, Virginia, June 13, 1786. He was brought up to the law, and admitted to the bar, but never practiced. Entering the army, he served with distinction in the war of 1812-14, especially in the capture of Fort George, Canada, and in the battles of Chippewa and Lundy's Lane. For his eminent services he was made major-general and received thanks and a gold medal from Congress. He afterwards visited Europe, and studied military science at Paris. In 1832 and the following years General Scott was employed in operations against the Indian tribes, and in 1841 he was appointed commander-in-chief. His fame rests upon his brilliant conduct of the Mexican war of 1846-47, in which he invaded Mexico, capturing Vera Cruz, winning a series of victories during his march inland, and finally capturing the Mexican capital and concluding an advantageous peace. He was nominated for the Presidency by the Whig party in 1852, but was defeated by the Democratic candidate. In 1855 the honorary rank of lieutenant-general was conferred upon him, with the provision that the title should cease at his death. At the outbreak of the Civil war he remained at the head of the army, but age and infirmities prevented his taking any actual command, and he retired in November, 1861, under full pay. He published his autobiography in 1864, and died at West Point, May 29, 1866.

Scottdale, a borough of Westmoreland Co., Pa., 30 miles S. E. of Pittsburgh, in a coal-mining district, has coal, coke and iron works, etc. Pop. (1920) 5768.

Scotts Bluff, a city of Scotts Bluff Co., Nebraska, near Wyoming border, in a noted sugar-beet region. Pop. 6912.

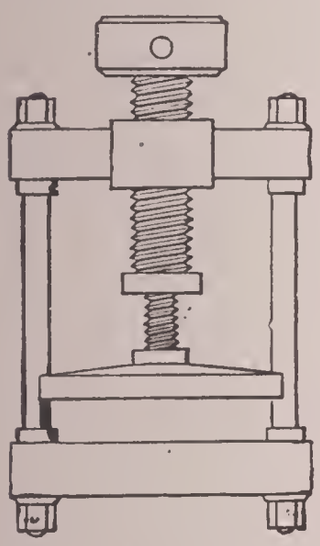
Scranton (skran'tun), a city of Pennsylvania, county seat of Lackawanna county, and the third city in size in the State, is situated on the Lackawanna River, at the junction of the Roaring Brook; 134 miles N. E. of New York, and 167 miles N. of Philadelphia on the Delaware, Lackawanna & Western, the Delaware & Hudson, the Central Railroad of New Jersey, the New York, Ontario & Western, and the Erie railroads. Its public buildings include a city hall, court house, government building, public library, etc. It is the metropolis of the anthracite coal regions and owes its prosperity in large part to the extensive operation in coal, and the development of the machine and metal-working trades incidental and contributary to the coal-mining business. It has many plants making varied lines of heavy hardware, and is one of the most important silk manufacturing centers in the United States. The population of the city by the census of 1910 was 129,867; in 1920, 137,783.

Screamer (skrē'mėr), the name given to two genera of South American grallatorial or wading birds, the *Palamēdea cornūta* or horned screamer (which see) and the closely allied *Chauna chavaria*, or crested screamer. The latter has no horn, but

its head is furnished with a dependent crest of feathers.

Screen (skrēn), in ecclesiastical architecture, a partition of stone, wood, or metal to separate different parts of the building, as the nave or an aisle from the choir, or a private chapel from the transept. The term is applied to a partition extending across the lower end of a mediæval hall, forming a lobby within the main entrance doors, and having often a gallery above; also to a decorated wall inclosing a courtyard in front of a building. The word has also a general use as a promoter of privacy, aside from its architectural one.

Screw (skrö), a wooden or metal cylinder having a spiral ridge (the thread) winding round it in a uniform manner, so that the successive turns are all exactly the same distance from each other, and a corresponding spiral groove is produced. The screw forms one of the six mechanical powers, and is simply a modification of the inclined plane. The energy is transmitted by means of a hollow cylinder (the female screw) of equal diameter with the solid one (the male screw), having a spiral channel cut on its inner surface so as to correspond exactly to the spiral ridge raised upon the solid cylinder. Hence the one will work within the other, and by turning the convex cylinder, while the other remains fixed, the former will pass through the latter, and will advance every revolution through a space equal to the distance between two contiguous turns of the thread. As the screw is a modification of the inclined plane it is not difficult to estimate the mechanical advantage obtained by it. If we suppose the power to be applied to the circumference of the screw, and to act in a direction at right angles to the radius of the cylinder, and parallel to the base of the inclined plane by which the screw is supposed to be formed, then the power will be to the resistance as the distance between two contiguous threads to the circumference of the cylinder. But as in practice the screw is combined with the lever, and the power applied to the extremity of the lever, the law becomes: The power is to the resistance as the distance between two contiguous threads to the circumference described by the power. Hence the mechanical effect of the screw is increased by lessening the distance between the threads or making them finer, or by lengthening the lever to which the power is applied. The law, however, is greatly modified by the friction, which is very great. The uses of the screw are various. It is an invaluable contrivance for fine adjustments such as are required in fine telescopes, microscopes, micrometers, etc. It is used for the application of great pressure, as in the screw-jack and screw-press; as a borer, in the gimlet; and in the ordinary screw-nail we have it employed for fastening separate pieces of material together. The *differential screw*, or *Hunter's screw*, is formed of two screws, a larger and a smaller, the former being screwed internally to allow the latter to screw into it; the pitch of the two screws differs slightly, and for each turn of the chief or larger screw the progress of the point of the compound screw is the difference of pitch. Great power is in this way attained without the weakness due to a screw with fine threads. See also *Screw-propeller*, *Archimedean Screw*, *Endless Screw*.



Hunter's Screw-press.

Screw-bean. See *Mesquite*.

Screw-pine (*Pandanus*), the type of an order of trees or bushes known as the Pandanaceæ or Screw-pine order. They are natives of tropical regions, and abound in insular situations, such as the Eastern Archipelago. They branch in a dichotomous or forked manner, and are remarkable for

Screw-pine (*Pandanus odoratissimus*).

the peculiar roots they send out from various parts of the stem. These roots are called aerial or adventitious, and serve to support the plant. The seeds are edible; and the flowers of some species are fragrant, as in the *Pandănus odoratissimus*, which is not uncommon in collections in Europe, and conspicuous by its adventitious roots, and its long spiny leaves, resembling those of the pineapple, which are arranged in a screw-like manner.

Screw-propeller, an apparatus which, being fitted to ships and driven by steam, propels them through the water, and which, in all its various forms, is a modification of the common screw. Originally the thread had the form of a broad spiral plate, making one convolution round the spindle or

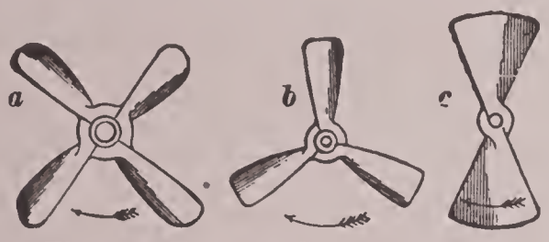


Fig. 1.— Forms of Screw-propeller.

shaft, but now it consists of several distinct blades, forming portions of two, three, or four threads, as illustrated by *a*, *b*, *c*, fig. 1, which gives an idea of the various forms of blades for different sizes of propellers: *a* has a good shape for the larger sizes; *b*, having three blades, is successfully applied for twin screw steamers, and is also useful with two blades for medium sizes; *c* is suitable for small diameters and a moderate number of rev-

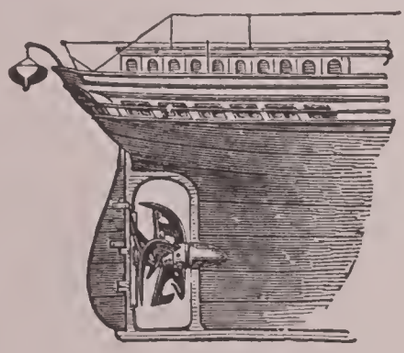


Fig. 2.— Screw-propeller in position.

olutions per minute. Either two or three blades of this shape answer well for barges and towing purposes. The usual position for the screw-propeller is immediately before the stern-post, as shown in fig. 2, the shaft passing parallel to the keel into the engine-room, where it is set in rapid motion by the steam-engines. This rotary motion in the surrounding fluid, which may be considered to be in a partially inert condition, produces, according to the well-known principle of the screw, an onward motion of the vessel more or less rapid, according to the velocity of the shaft, the obliquity of the blades, and the weight of the vessel. In 1827 Mr. Wilson, of Dunbar, produced a screw-propeller which proved satisfactory, but the successful introduction of the screw-propeller is due to Mr. F. P. Smith and to Ericsson, who both independently and about the same time (1838) secured patents. Numerous modifications of the screw-propeller have been proposed and adopted since it was first introduced, and it has now practically superseded the paddle-wheel for sea-going vessels, and has come very generally into use for river traffic. Twin-screws have recently come into favor for use on the Atlantic liners; and even triple screws in some instances. For warships the screw-propeller is indispensable, as a protection to the motive power of the vessel.

Scribe (skrēb), Augustin Eugène, a French dramatic writer, born at Paris in 1791; died in 1861. His father was a silk merchant, and bequeathed to his son a considerable fortune. Young Scribe was originally intended for the legal profession, but at the age of twenty he abandoned it for the more congenial occupation of a writer for the stage. His first distinct success was achieved in 1816 with *Une Nuit de Garde Nationale*, and thenceforward his pen was never idle. His dramatic pieces comprise all the departments of the lighter kind of drama, and from their gayety and interest of plot, as well as the felicitous manner in which modern French life is depicted in them, have acquired a universal popularity over the European continent, and have also been introduced on the English and American stage in the form of translations or adaptations. Two of the best known among them, after the first successful one, are *Le Verre d'Eau* ('Glass of Water') and *Adrienne Lecouvreur*. As an opera librettist Scribe is also deservedly famous, having supplied several composers, especially Auber and Meyerbeer, with the text of the most celebrated of their works. His works, frequently collaborations, number several hundreds. In 1838 he was admitted a member of the French Academy.

Scribe (skrīb), among the Jews, an officer of the law. There were *civil* and *ecclesiastical* scribes. The former were employed about any kind of civil writings or records. The latter studied, transcribed, and explained the Holy Scriptures.

Scrip (skrip; abbreviation of *subscription*), a certificate of loans or shares in a joint-stock company, forming a temporary acknowledgment of the holder's interest, and indicating the amount and date of each installment of the total subscribed or to be subscribed by him, the scrip being finally exchanged for a definite share certificate or bond.

Scrivener (skriv'en-er), Frederick Henry Ambrose, an English biblical scholar, born in 1813. He was educated at Trinity College, Cambridge, where he took the degree of M.A. in 1838. From 1846 till 1856 he was head-master of Falmouth School and incumbent of Penwerris, and he retained this living till in 1861 he was presented to the rectory of Gerrans, Cornwall. In 1870 he was appointed a member of the Company of Revision of the New Testament, and in 1872 he was granted a pension from the civil list in recognition of his services in connection with biblical criticism. In 1875 he became vicar of Hendon, Middlesex, and prebendary of Exeter. Dr. Scrivener took high rank in the philological criticism of the New Testament, on which he published a series of valuable works. He died in 1891.

Scrofula (skrof'ū-la), or Scrophula, a disease due to a deposit of tubercle in the glandular and bony tissues, and in reality a form of tuberculosis or consumption. It generally shows itself by hard tumors of the glands in various parts of the body, but particularly in the neck, behind the ears, and under the chin, which, after a time, suppurate, and degenerate into ulcers, from which, instead of pus, a white curdled matter is discharged. The first appearance of the disease is most usually between the third and seventh year of the patient's age; but it may arise at any period between this and the age of puberty, after which it seldom makes its first attack. It is by no means a contagious disease, but is of a hereditary nature, and is often entailed by parents upon their children. It may, however, remain dormant through life, and not show itself till the next generation. The disease generally goes on for some years; and appearing at last to have exhausted itself, all the ulcers heal up, without being succeeded by any fresh swellings, but leaving behind them an ugly puckering of the skin, and a scar of considerable extent. This is the most mild form under which scrofula appears. In more virulent cases the eyes and eyelids are inflamed, the joints become affected, and caries of the bones supervenes. Hectic fever at last arises, under which the patient sinks; or the disease ends in tuberculated lungs and pulmonary consumption. Scrofula is also called *struma* and *king's-evil*.

Scroll (skrōl), a very frequent ornament in architecture, consisting of a band arranged in undulations or convolutions. The name is also given to the volute of the Ionic and Corinthian columns.

Scrophulariaceæ (skrof-ū-lar-i-ā'-se-ē), a very large nat. order of herbaceous or shrubby monopetalous exogens, inhabiting all parts of the world except the coldest, containing about 160 genera and 1900 species. They have opposite or alternate entire toothed or cut leaves, and usually four or five lobed irregular flowers with didynamous stamens, placed in axillary or terminal racemes; with a two-celled ovary and albuminous seeds. Many of the genera such as the foxglove, calceolaria, veronica, mimulus, antirrhinum, pentstemon, etc., are valued by gardeners for their beautiful flowers. *Scrophularia* is the typical genus. A decoction of *S. nodosa* is sometimes used by farmers to cure scab in swine.

Scruple (skrö'pl), in Troy weight, is equivalent to 20 grains, 1-3 part of a drachm, 1-24 part of an ounce, and 1-288 part of a pound.

Scrutin d'Arrondissement (skrú-taṇ dȧ-rōn-dēs-mäṇ), in France, the system of voting whereby each *arrondissement* or district of a department returns its own member for parliament, each voter of the *arrondissement* having only one vote. *Scrutin de Liste*, on the other hand, is the system of voting whereby all the candidates for a department are put upon the same list and returned at the same election.

Scudder (skud'er), Horace Elisha, author, was born at Boston, Massachusetts, in 1838. He was graduated from Williams College in 1858, engaged in literary pursuits, and was editor of the *Atlantic Monthly*, 1890–98. He wrote a series of stories for children, *Noah Webster*, *Boston Town*, *History of the United States*, etc. He died January 11, 1902.

Scudder, Samuel Hubbard, naturalist, brother of the preceding, was born at Boston in 1837, and was graduated from Williams College in 1857. He wrote a work on *Butterflies* and many scientific papers and in 1883 became editor of *Science*. He gave special attention to fossil insects and wrote several books about them. Died in 1911.

Scudéri, or Scudéry (skû-dā-rē), Madeleine de, a French writer of romances, born at Havre in

1607, became one of the most conspicuous figures in the literary circle of the Hôtel Rambouillet at Paris, and acquired great fame by her romances, *Artamène ou le Grand Cyrus*, *Ibrahim ou l'Illustre Bassa*, *Clélie*, *Almahide*, and others of almost interminable length, almost entirely forgotten now, even by name. The secret of their great popularity at that time consists in this, that they were fairly representative of her age, being, in fact, the reflection of the society in which she moved. Her nominal heroes and heroines were classical or oriental personages, but the names of her characters were, in fact, only a transparent mask behind which her readers saw and read themselves. The interminable conversations and meaningless gallantries which make her works dull at present were precisely what gave them interest when all her characters were known; and as she was admired and respected by those she portrayed, it is evident they were flattered by her portraits. After the reunions at the Hôtel Rambouillet had been broken up by the troubles of the Fronde, Mdlle. de Scudéri opened her own house to a select society of similar tastes. She died in 1701.— Her brother, GEORGES DE SCUDÉRI, was a writer of tragedies, etc., and an enemy of Corneille. He was born in 1601; died in 1667.

Scudo (skö'dō; It. *scudo*, L. *scutum*, a shield), an ancient Italian coin, the equivalent of a crown. It was named from its bearing the impress of the heraldic shield of the sovereign by whom it was issued. The scudo was of different value in different states and at different times. The name is sometimes given to the piece of five lire or francs, nearly equivalent to the American dollar.

Scull. See *Rowing*.

Sculpin (skul'pin; *Cottus octodecimspinosus*), a small sea-fish found on the Atlantic seaboard and on the Pacific coast of America. The gemmeous dragonet (*Callionymus lyra*) is so-called by the Cornish fishermen.

Sculpture (skulp'tūr), the art of imitating living forms in solid substances. The word means strictly, a cutting or carving in some hard material, as stone, marble, ivory, or wood; but it is also used to express the molding of soft substances, as clay or wax, and the casting of metals or plaster. The imitation of living form is alike the essence of sculpture and of painting, and both these arts are primarily for the use and purposes of architecture. Sculpture is distinguished from architecture by its imitation of living form, and is separable from painting by the mode of its expression. Sculpture may possess the added element of color; but while painting makes its appeal to the sense of sight chiefly through color, sculpture concerns itself wholly with pure form, whether of line or composition.

Processes.— In producing a work of sculpture two processes are involved, 'modeling' and 'casting,' the former alone being truly the work of the artist. For ornament and figure the same method is employed. In the former a ground of clay is prepared, and upon it the lines of the ornament are lightly sketched, usually with a tool. These are then clothed upon firstly with important masses, then the connecting lines, and, lastly, the minor detail, the whole being afterwards modeled to the forms desired. For a head or bust a flat board, set on a high stand, with a piece of wood standing at right angles to it, is used. Lead-piping is sometimes further employed to raise the height of this piece of wood, and around this structure the clay is roughly built up, a cylindrical mass for the neck, and an egg-shaped form for the head. Upon this latter the position of the features is marked, and the work carried on by reference to the living model. For a full-length figure an 'armature' is prepared, consisting of an iron passing through the center and attached to which are other irons in the case of statues, or of lead piping for statuettes. These are bent to the required positions, the whole when complete representing in line the pose and character of the intended figure. Upon and around this framework the figure is first roughly built up with clay, care being taken to add just as much as is requisite, and to follow the general form and direction of the muscles. The essential difference between modeling and carving is that in the former the artist works from within outwards by the addition of material, while in the latter from without inwards by the taking away of material. The sculptor's work proper generally ends with the completion of the clay model. The next process is that of casting. Plaster of Paris of the consistency of thick cream is poured over the model to the depth of from 2 to 3 inches, the inner layer being colored. When this is set, the clay is carefully removed, and what is termed a 'waste mold' is formed. This is carefully washed and when dry is then oiled. Into this mold plaster of Paris is poured, and when filled and set hard the waste mold is chipped off. The plaster of Paris has taken the place of the clay, and formed what is called a 'cast.' A head is usu-

VENUS DE MILO

APOLLO BELVIDERE

MARS

MERCURY

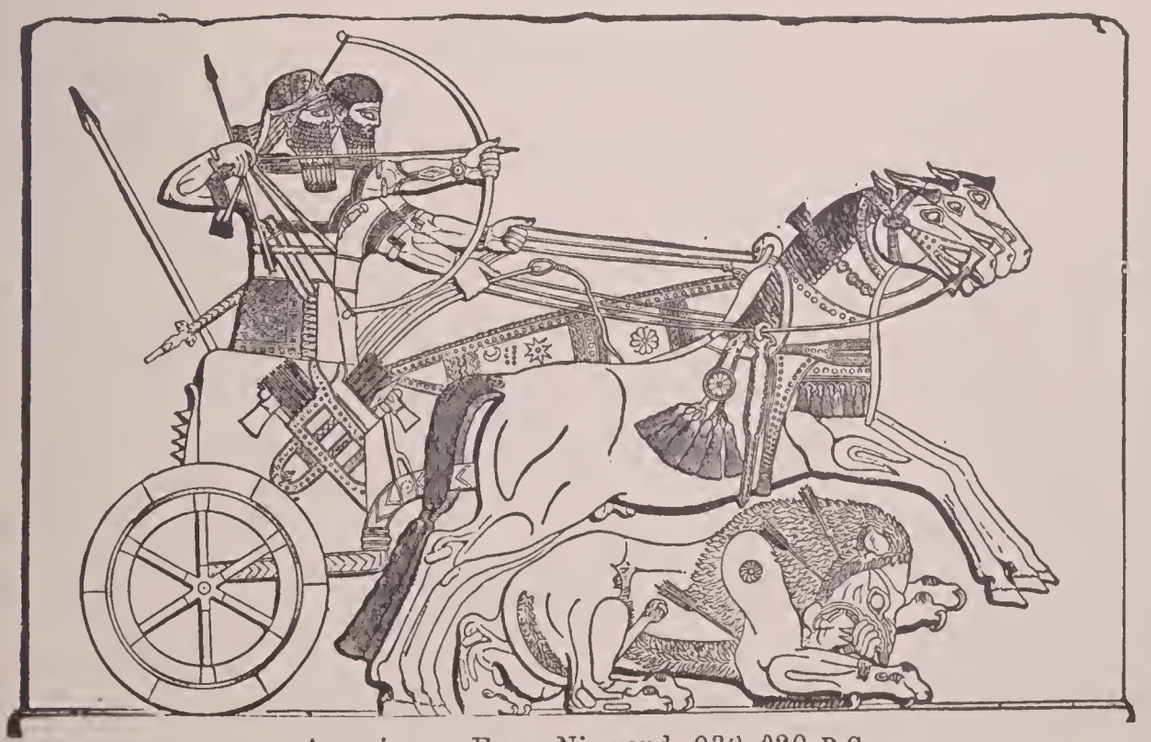
Four masterpieces of sculpture. The Venus de Milo and the Mars are in the Louvre Museum, Paris; the Apollo Belvidere in the Vatican, Rome; the Mercury in the Acropolis Museum, Athens, Greece.

ally cast in halves, and a similar treatment is adopted in the case of complete figures. This is termed 'piece molding.' Parts which project very much are removed and cast separately, being afterwards attached by means of plaster of Paris. The reproduction of this plaster cast in marble or stone is a mechanical operation, usually intrusted to a skilled workman. To aid him he employs a 'pointing machine,' by which he first finds out the distance of any point on the cast from an imaginary vertical plane placed in front, and into the block of marble drills a hole whose depth from the same plane equals this distance. Innumerable holes are thus drilled, and the solid marble cut away until the bottoms of all the holes are reached. This gives the form roughly, and the carver proceeds to copy from the plaster cast, carrying on the work under the supervision of the sculptor, who rarely carves the work himself except in finishing touches. For casting in metal a plaster mold is first made as already described. Within this is fixed a rudely-formed, solid, but removable mass called a 'core,' the space between it and the surface of the mold being filled with the molten metal. Another method for smaller work is called '*cire perdue*.' In this the mold is lined with wax and the core inserted close up to the wax lining. The wax is then melted out and the molten metal poured into the mold to take its place, the core being afterwards removed.

History: Sculpture in Asia.— The earliest records of sculpture that we possess exhibit the art in complete bondage to religion. The artist has striven not to represent human or natural beauty, but to illustrate a strange and fantastic mythology. Sculpture has here no independent existence, and no chance of gradual and steady development. The artist is restricted to the patient and often exquisite imitation of inanimate

Egyptian.— From large figure in bronze.

nature, or to the invention of monstrous human form, but he is not able to rise to a conception of beauty, at once true to physical nature and charged with human emotion. Thus the sculptures of India and China are semibarbaric and naturalistic; and in the colossal figures of the rock-cut temples of India there is a superadded symbolism, which led to the most extravagant deformities of the hu-



Assyrian.— From Nimroud, 930–920 B.C.

man figure. It is to Egypt that we must turn for the first signs of higher and more vital art. The distinctive characteristics of Egyptian sculpture are colossal size, stability, and symmetry, the expression being that of calm repose and solemnity, with a suggestion of the supernatural. A conventional uniformity reigns everywhere without life or action. Everything is subject to symbolic meaning according to formulæ laid down by authority. The work was executed in syenite or basalt, and this symbolism, linked with admirable regularity of workmanship, give to Egyptian sculpture the distinction and dignity of a style. The best period of Egyptian sculpture was from 1450 to 1000 B.C. The best period of Assyrian sculpture as a style, is inferior to that of Egypt. Its characteristics are an intense and vigorous spirit of representation without the least reference to ideal beauty of any kind. As compared with Egyptian work it is more realistic but less true. It is powerful and energetic, but lacks grandeur; overladen with detail and ornamentation it does not attain to the sublime in its repose, nor to beauty in its movement. Persian sculpture (560–331 B.C.) differs but little from Assyrian, and is usually included with it. Roughly hewn and badly modeled, the force of the animal forms yet gives it a sense of the gigantic, analogous to that obtained by the Greeks in their treatment of Hercules, but withal possessing no sense of ideal beauty. In the British Museum is to be found a splendid collection of Egyptian sculptures, extending from B.C. 2000 to the Mohammedan invasion, A.D. 640.

Greek Sculpture.— These early products of art, valuable in themselves, are nevertheless chiefly interesting as leading the way to the full development of sculpture under the Greeks. Greek sculpture, in its infancy, is strongly stamped with oriental character, as may be seen by a careful examination of the reliefs from the temple of Assos now in the Louvre, and the metopes from Selinus, casts of which are in the British Museum. But from the end of the sixth century B.C. the development of Greek art was rapid and continuous. In the sculptures for the temple of Egina, executed about 475 B.C., and now preserved at Munich, the figures of the warriors (see the casts in the British Museum) are no longer of stiff conventional type, with attitudes correct but lifeless; there is energy and movement in their action, and a living truth of gesture only to be gained by artists who had studied the human form long and attentively. Upheld on the one hand by a noble mythology, that magnified without distorting human attributes, and supported on the other by an increasing knowledge of nature, the ultimate perfection of Greek art became only a question of time. It came to perfection in Phidias, whose statues of Athene in the Parthenon at Athens (B.C. 438), and of Zeus in the temple at Olympia, mark

Grecian.— 1, Faun of Praxiteles — Florence. 2, Niobe — Florence. 3, Amazon — the Vatican.

the period of the highest style of Greek art. The special character of the art that flourished at Athens under the rule of Pericles (fourth century B.C.), and by the all-potent hand of Phidias, consists in a perfect balance and combination of elements sublime and human. Sculpture had reached that point when a faultless imitation of nature was within its reach, but it had not yet abandoned its spiritual connection with a splendid mythology. We have therefore, in the sculpture of this period, the highest type of human beauty joined to a god-like calm and reticence of emotion. Examples of the grand style of this epoch are the sculptures of the Parthenon; the colossal bronze head of *Artemis* in the British Museum; the

Renaissance.— 1, St. George, Donatello, Florence. 2, Moses, Michael Angelo. 3, Nymph, Goujon.

Venus of Milo, in the Louvre; and the exquisite relief representing the *Parting of Orpheus and Eurydice*, in the Museum at Naples. Greek art, however, rapidly moved towards a still closer imitation of actual human life. The calm elevation of spirit characteristic of the sculpture of Phidias, and of his pupil Alcamenes, was exchanged for a more life-like rendering of passion, and the artist began to be fascinated by the force and variety of human feeling as well as by the beauty of human form. The representatives of this later style were Scopas and his younger contemporary Praxiteles. The most important works of Scopas that survive are the decorations to the mausoleum at Halicarnassus, erected by Artemisia over the remains of her husband Mausōlos, prince of Caria, B.C. 352. These sculptured decorations, now in the British Museum, present in the designs for the frieze, depicting a battle between Greeks and Amazons, an invention of graceful and energetic movement, and a record of rapid and violent gesture such as clearly distinguish the work from that which it succeeded. The works of Praxiteles are especially valuable as expressing a tenderness of feeling which this new and closer sympathy with human emotions had developed. He is known to us chiefly through copies of his works, or of the works of his school, the most celebrated of which are preserved in the Vatican; but the sweetness and delicate grace of his style are admirably displayed in the statue of *Ceres* discovered at Cnidus, and now in the British Museum. To this period belong the celebrated group of *Niobe and Her Children;* also the bronze figure of *Narcissus* in the Naples Museum. From the death of Alexander the Great, B.C. 323, onwards to the conquest by the Romans, B.C. 146, the progress of Greek sculpture is only a further, and often a weaker, development of the same ideal. The celebrated group of the *Laocoön*, the head of the *Dying Alexander*, the *Dying Gladiator*, and the *Apollo Belvedere*, are some of the works of this epoch that are preserved to us.

Italy.— The history of sculpture in Italy is only a continuance of its story

in Greece. It was Greek art produced by Greek workmen that adorned the palaces of the emperors; and the Roman sculptors, in so far as they had any inde-

St. Michael and Satan.— Flaxman.

pendent existence, can only claim to have impoverished the ideal they received from Greece. Many of the best-known statues in existence were produced in the Græco-Roman period; as the *Borghese Gladiator* in the Louvre, the *Venus de Medici* at Florence, and the *Farnese Hercules* at Naples. From the time of Hadrian (A.D. 138) art rapidly declined, and this debased Roman was the only style employed in Italy until the revival in the twelfth century. This revival of sculpture began with Nicola Pisano, who was born at Pisa about A.D. 1206, and whose work is preserved in the pulpits which he carved at Pisa and Siena. He was followed by his son Giovanni Pisano (died 1320), whose great work is the allegorical group in the Campo Santo of Pisa; but both of these sculptors worked on classic lines. Jacopo della Quercia (1374-1438), whose beautiful reliefs adorning the façade of the Church of San Petronia at Bologna show a feeling for grace not before expressed, was the founder of the modern school. Lorenzo Ghiberti (1381-1455) developed a more pictorial style with extraordinary success; but sculpture awaited the advent of Donatello (1386-1468) in order to find its true direction and to reach its full triumph. His marble statue of *St. George*, in the church at Or San Michele in Florence, is one of the very finest works of renaissance sculpture. Luca della Robbia (1400-81), and Andrea Verrocchio (1432-88), the master of Leonardo da Vinci, may also be named. The special tendencies of Italian sculpture may be said to have reached their full expression in the work of Michael Angelo (1475-1564). Here we see all previous efforts to interpret passion and feeling summed up and concluded. His figures are charged with all the possibilities of human experience and emotion. It was towards this complete understanding of the resources of physical expression that all Italian art had been tending, and it is only more fully exhibited in Michael Angelo because he was the greatest master that Italy produced. His works are the statues in the chapel of the Medici at Florence, the *Captives* in the Louvre, the colossal *David* at Florence, the *Moses* in Rome, and the *Madonna* in Bruges. For a long period after Michael Angelo, Italian sculptors were content to imitate, and sometimes to exaggerate his manner. Lorenzo Bernini (1598–1680), the master of the 'baroco' style, exemplifies a straining after grace and elegance by means of affectation. In the eighteenth century Italy became the headquarters of the classical revival which spread

John Hampden.— Foley.

thence throughout Europe. The leading spirit in this movement was Canova (1757-1822), who, although he failed to restore to his art its earlier masculine strength, at least sought in the study of the antique for greater simplicity and elegance in representation. Canova's most finished productions are notable for an affectionate tenderness of sentiment rather than imagination, and his figures are never formed after the highest ideal. But within the narrower limits of his style he produced much that is graceful, and he combined in a manner peculiar to himself a reminiscence of antique grace, with a feeling entirely modern and almost domestic in its tenderness. His most characteristic works are the *Graces*, the *Hebe*, and the *Cupid and Psyche* (all well known), but his finest work is the colossal group of *Theseus Slaying a Centaur* at Vienna. Canova formed Thorvaldsen, the great Danish sculptor, and his name and influence dominated the art of sculpture throughout Europe for many years. His pupils were Tenerani and Giacometti, and among later sculptors occur the names of Bartolini and Dupré. Italian sculpture of to-day has a strong bias towards realism, the chief exponents being Monteverde and Gallori, Magni and Barzaghi, though Consani, Albani, and Fedi form exceptions.

France.— The early art of France was influenced by the then prevailing styles. Thus the sculptures of her cathedrals show Byzantine, Romanesque, and Gothic influences, the finest examples in this last being at Amiens. Awakening in the fifteenth century it produced as precursors of the renaissance Bouteillier and Colombe (1431-1514), and in the sixteenth century Jean Goujon (1530-72), whose best work is the *Fountain of the Innocents* in Paris, and whose *Diana* shows all the faults and beauties of the style. Cousin (1501-89), Pilon (1515-90), Pierre Puget (1622-94), Coysevox (1640-1720), and Girardon (1630-1715) continued the style, which, while aiming at elegance and grace, lost simplicity and roundness. The Danish school which produced Thorvaldsen, owes its rise to French influence. Later yet come Houdon (1741-1828), Bosio (1769-1845), Rude (1785-1855), Barye (1795-1875), a sculptor of animals, and Carpeaux, whose chief work, *La Danse*, is in front of the new opera house (1827-75); and among living artists are St. Marceaux, Frémiet (animal), Falguière, Mercié, Dalou, Rodin, and Dubois (monument of General Lamoricière), who form a school which is the foremost and most vital in Europe.

Germany.— There was no early school of German apart from the general Gothic style of all northern European countries, but with the renaissance of the fifteenth century arose Adam Krafft (1480-1507) and Peter Vischer, two contemporary sculptors of Nuremberg, and Albert Dürer (1471-1528), painter and sculptor. Then came a break until the rise of the modern school, which owes its existence to the influence of Thorvaldsen. The chief names are Dannecker (1758-1841), with his *Ariadne* and Schadow with *Girl Tying Her Sandal* (1764-1850). Rauch (1777-1857) was the real founder of the modern German school. His monument to Frederick the Great at Berlin, with its many accessory figures, is his finest work, and from his school came Rietschel (1804-60), Schwanthaler (1802-48), August Kiss (1802-65), Bandel (1800-76), and Drake (1805-82). Schilling is the most noted among the living sculptors of Germany.

England.— Of examples of sculpture executed before the eighteenth century England possesses very few. Several tombs exist, and some of the cathedrals, notably Wells, Exeter, and Lincoln, possess figures executed presumably by Englishmen at an earlier date. It is not, however, until the reign of Charles I that names of artists appear, notably among them being Nicholas Stone (1586-1647), and Grinling Gibbons (1648-1721), who was the first real artist of the English school. Cibber may be mentioned, but Joseph Wilton was the forerunner of the school which produced Banks and Flaxman. Banks (1735-1805) is the father of ideal English sculpture, but died unappreciated, leaving John Flaxman (1755-1826) to achieve the task of bringing the classical spirit into English art, and founding the school of the nineteenth century. His love for severe simplicity and true form was imbibed in Rome, and is best seen in his *Shield of Achilles*, in his *Michael Overcoming Satan*, and his *Cephalus and Aurora*. He greatly assisted Wedgwood in the design and decoration of his pottery, and executed a number of beautiful designs in outline illustrative of Homer and of Dante. His most famous pupil was Baily (1788-1867), whose *Eve at the Fountain* is much admired. Sir Francis Chantry (1788-1841) worked chiefly on portrait figures and busts, and Sir Richard Westmacott (1799-1856) on monuments. John Gibson (1791-1866), a pupil of Canova, more properly belongs to the Italian than the English school, his whole artistic life having been passed in Rome. His finest works are *Psyche Borne by Zephyrs*, the

Narcissus, *Hylas Surprised*, and a large relievo of *Christ Blessing Children*. The *Hylas* is now in the National Gallery. His introduction of color in statuary raised much discussion. Foley (1818-75), whose chief work is the equestrian statue of General Outram, now at Calcutta, and Patrick Macdowall (1799-1870) with *Love Triumphant*, are the last names of the classic school. The tendency of sculpture in England at the present day is towards a more original and naturalistic treatment. Alfred Stevens (died 1875) is the author of the finest decorative work in England, the monument of the Duke of Wellington in St. Paul's, London; and among the more distinguished of living men are Woolner, Boehm, Thornycroft, Gilbert, Brock and Leighton, whose works, with those of some younger men, go far to give English sculpture a high place.

United States.— Among earlier sculptors Powers and Crawford hold commanding positions. Powers' *Greek Slave* represents a high type of beauty. Among his more important works are *Il Penseroso*, *Proserpine* and the *Fisher Boy*. Crawford's equestrian statue of Washington, his *Beethoven* and the *Peri at the Gate of Paradise* have attracted much attention; the American Revolution as illustrated on the bronze door of the Capitol at Washington and the Statue of Liberty on the dome of the Capitol are also important. The *Indian Chief* and *Orpheus and Cerberus* have won admiration. Horatio Greenough's *Chanting Cherubs*, the Bunker Hill Monument and the statue of Washington at the National Capitol are noble works of art. Clevenger (1812-1843) and Henry K. Brown (1814-1886), were artists of merit. Akers (1825-1861) in his *Pearl Diver* exhibited his thorough knowledge of the principles of art and a strong imaginative faculty. Bartholomew (1822-1858) produced several classic and scriptural subjects in which he showed a rare natural talent. Story (b. 1819) holds a conspicuous place among American sculptors. Versatile, with a delicate and noble sentiment, his work is not strictly original, but is marked by careful finish. *Jerusalem Lamenting*, *Cleopatra*, *The Sibyl*, and *Medea* exhibit his almost perfect work. Rinehart (1825-1874) is a truly idealistic sculptor. Rogers, Mead, Palmer are favorably known. J. Q. A. Ward (b. 1830) has done work most thoroughly national and entirely original. His statue of Washington is a noble contribution. The *Indian Hunter* is a remarkable example of American art. Launt Thompson, Palmer's pupil, as a portrait sculptor, has been most successful. We can instance his bust of Edwin Booth, and statues of Napoleon and General Sedgwick. Rogers' 'groups' appeal to popular feeling and have had an educating influence. St. Gaudens, O'Donovan, Roberts, Dengler, French, Hartley and Warner are younger artists whose works reflect credit on American sculpture. Barnard's admirable symbolical groups for the Pennsylvania capitol, at Harrisburg, rank among the ablest achievements of modern sculpture. Of women sculptors in America can be mentioned Harriet Hosmer, whose *Sleeping Faun* and *Zenobia* bear marks of strong individuality. Emma Stebbins, Anne Whitney, Vinnie Ream Hoxie and Edmonia Lewis deserve permanent record.

Scuppers (skup'erz), channels cut through the sides of a ship at the edges of the deck to carry water off the deck into the sea.

Scurvy (skur'vi), a disease of a putrid nature prevalent in cold and damp climates, and which chiefly affects sailors, and such as are deprived of fresh provisions and a due quantity of vegetable food. It seems to depend more on a defect of nourishment than on a vitiated state; and not to be of a contagious nature. It comes on gradually, with heaviness, weariness and unwillingness to move about, together with dejection of spirits, considerable loss of strength, and debility. As it advances in its progress the countenance becomes sallow and bloated; respiration is hurried on the least motion; the teeth become loose; the gums are spongy; the breath is very offensive; livid spots appear on different parts of the body; old wounds, which have long been healed up, break out afresh; severe wandering pains are felt, particularly by night; the skin is dry; the urine small in quantity; and the pulse is small, frequent, and towards the last intermitting; but the intellect, for the most part, clear and distinct. By an aggravation of the symptoms the sufferer in its last stage exhibits a most wretched appearance. Scurvy as usually met with on shore is unattended by any symptoms other than slight blotches, with scaly eruptions on different parts of the body, and a sponginess of the gums. In the cure, as well as the prevention of scurvy, more is to be done by regimen than by medicines, obviating as far as possible the several remote causes of the disease; but particularly providing the patient with a more wholesome diet, and a large proportion of fresh vegetable

Both as a preventive and as a curative agent lime or lemon juice is of the first importance in this disease.

Scurvy-grass (*Cochlearia officinālis*), a cruciferous plant, growing in Britain and elsewhere on the seashore and high up on the mountains. It has long been esteemed for its antiscorbutic property, and hence its name. The leaves are slightly pungent, and are sometimes used as a salad.

Scutage (skū'tij), or ESCUAGE (L. L. *scutagium*, from L. *scutum*, a shield), in feudal law, the service by which a vassal was bound to follow his lord to war at his own charges. It was subsequently commuted for a pecuniary satisfaction and became a parliamentary assessment, the custom of commuting service having become general and the rate of commutation variable.

Scutari (skö'tä-rē), a town of Asiatic Turkey, on the Bosphorus, opposite Constantinople, of which it is a suburb. It is built on an amphitheater of hills, and contains numerous mosques, fine bazaars and baths, barracks, and a seraglio of the sultan. Behind the town is an immense cemetery. Scutari contains granaries and is a fruit market. The manufactures are saddlery, silk, muslin and cotton stuffs. Pop. 105,500.

Scutari, a town of European Turkey, capital of North Albania, at the south end of the lake of same name. It has manufactures of arms and cotton stuffs, and being situated on the Bojana, by which the lake (18 miles long by 6 wide) discharges its waters into the Adriatic, is favorably situated for commerce. Pop. about 32,000.

Scutcheon. See *Escutcheon.*

Scutching Machine (skuch'ing), a machine for rough-dressing fiber, as flax, cotton, or silk.

Scylla (sil'la), a rock in the Strait of Messina, on the Italian side nearly opposite the whirlpool of Charybdis. Various legends were associated with Scylla and Charybdis, which were esteemed highly dangerous to navigators. See *Charybdis.*

Scyllidæ (sil'li-dē), the dog-fishes, a family of small-sized but very abundant sharks. They are caught in great numbers for the sake of their oil. See *Dog-fish.*

Scymnidæ (sim'ni-dē), a family of sharks, distinguished by the absence of an anal fin, and by dorsals unfurnished with spines. The lobes of the caudal fin or tail are nearly equal, and the head is furnished with a pair of small spiracles. The Greenland shark is the best-known species.

Scyros. See *Skyros.*

Scythe (sīth), an instrument used in mowing or reaping, consisting of a long curving blade with a sharp edge, made fast at a proper angle to the lower end of a more or less upright handle, which is bent into a convenient form for swinging the blade to advantage. Most scythes have two short projecting handles fixed to the principal handle, by which they are held. The real line of the handle is that which passes through both the hands, and ends at the head of the blade. This may be a straight line or a crooked one, generally the latter, and by moving the short handles up or down the main handle, each mower can place them so as best suits the natural size and position of his body. For laying cut corn evenly, a *cradle*, as it is called, may be used. The cradle is a contrivance somewhat resembling a rake, with three or four long teeth so fixed to the scythe as to stretch the cut grain properly at each sweep of the scythe. A species of scythe which has been called the cradle-scythe is regularly used with the cradle for reaping in some localities. One form of scythe has a short branching handle somewhat in the shape of the letter Y, having two small handles fixed at the extremities of the two branches at right angles to the plane in which they lie. The Hainault scythe is a scythe used with only one hand, and is employed when the corn is much laid and entangled. The person has a hook in one hand with which he collects a small bundle of the straggling corn, and with the scythe in the other hand cuts it. The scythe has largely gone out of use since the advent of the mowing machine.

Scythian (sith'i-an), a name very vaguely used by ancient writers. It was sometimes applied to all the nomadic tribes which wandered over the regions to the north of the Black and the Caspian Seas, and to the east of the latter. In the time of the Roman Empire the name Scythia extended over Asia from the Volga to the frontiers of India. The people of this region, being little known, were the subject of numerous fables.

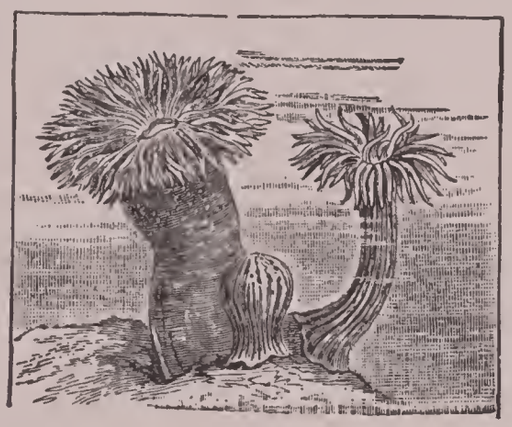
Scythrops (sith'rops), the channel-bill, a genus of birds belonging to the cuckoo family. Only one species is known, the *S. Novæ Hollandiæ*, a very handsome and elegantly colored bird inhabiting part of Australia and some of the Eastern Islands, about the size of the common crow. It has a large

and curiously formed beak, which gives it so singular an aspect that on a hasty glance it might almost be taken for a toucan or hornbill.

Sea. See *Ocean.*

Sea-acorn. See *Balanus.*

Sea-anemone (sē-a-nem′ō-nē), the popular name given to a number of animals of the subkingdom Cœlenterata and class Actinozoa, including the genus *Actinia* and other genera. They are among the most interesting organisms met with on the sea-beach, and in aquaria form a great attraction. All sea-anemones, however varied in coloration or form, present the essential structure and appearance of a fleshy cylinder, attached by its base to a rock or stone, and presenting at its free extremity the mouth, surrounded by a circlet of arms or tentacles. With these tentacles, which may be very numerous,



Sea-anemones.
a, Heliactis bellis. b, Cylista viduata.

in some cases exceeding 200 in number, they seize and secure their food — small crustacea, molluscs, such as whelks, etc.— which they paralyze by means of the thread-cells common to them with all Cœlenterata. The mouth leads into a stomach-sac, which, however, is imperfectly specialized, and is such that a generalized idea of the structure of a sea-anemone may be gained by supposing that the animal in transverse section represents a double tube, the outer tube corresponding to the body-walls, and the inner tube to the stomach-sac. When fully expanded the appearance of the anemones in all their varieties of color is exceedingly beautiful. But upon the slightest touch the tentacles can be quickly retracted within the mouth-aperture, the fluids of the body are expelled by the mouth, and the animal, from presenting the appearance of a fully expanded flower, becomes a conical mass of jelly-like matter. Although these forms are attached to rocks and fixed objects, they appear able to detach themselves at will. They are, most of them, diœcious, that is, having the sexes situated in different individuals. The young are developed within the parent body, and appear in their embryo state as free swimming ciliated bodies of an oval shape. The sea-anemones resemble the *Hydræ* in their marvelous powers of resisting injuries and mutilation. Thus if a sea-anemone be divided longitudinally a new animal will in due time be formed out of each half. They appear singularly insusceptible also to the action of hot or cold water, and seem to be wonderfully long-lived. A well-known instance of longevity on the part of the sea-anemone is that afforded by one named 'Granny,' which was taken by Sir John Dalyell in 1828, and lived till 1887. They are eaten as food in Italy, Greece, Provence, and on various other coasts.

Sea-ape, a name sometimes given to the fox-shark or thresher. See *Thresher.*

Sea-bathing, produces the stimulating effects of the ordinary cold bath with the additional stimulus due to the salt, so that it acts as an invigorating tonic. Persons who are anæmic — that is, of deficient quality of blood — and those suffering from any internal complaint ought to refrain from sea-bathing. It has, however, been found very salutary in several complaints, as diseases of the glands of all kinds, and of the skin in scrofula and a scrofulous predisposition, exhausting sweats, and tendency to catarrhs, chronic nervous diseases, particularly hysteric attacks, epilepsy, St. Vitus's dance; also sometimes in chronic rheumatism. Many physicians advise sea-bathing for their patients.

Sea-bear, a name sometimes given to the polar bear (see *Bear*); also to a kind of seal. See *Seal.*

Sea Buckthorn, or **Sallow Thorn,** large shrubs or trees with gray silky foliage and entire leaves. There is but one known species, sometimes called the sea buckthorn, a large thorny shrub or low tree, a native of parts of the sandy sea-coasts of England and the continent of Europe, and found also throughout a great part of Tartary. It is sometimes planted to form hedges near the sea, growing luxuriantly where few shrubs will succeed. The berries are orange colored and are gratefully acid.

Sea-cat, a name given to the *Chimæra monstrosa.* See *Chimæra.*

Sea-cow. See *Manatee.*

Sea-cucumber. See *Holothuria.*

Sea-dace. See *Bass.*

Sea-devil. See *Angler.*

Sea-dragon (*Pegăsus draco*), a teleostean fish included among the Lophobranchii (which see). The breast is very wide, and the large size of the pectoral fins, which form wing-like structures, together with its general appearance, have procured for this fish its popular name. *P. natans*, an allied species, has smaller pectoral fins and a larger body. The sea-dragon occurs in Javanese waters. The dragonets (*Callionymus*), fishes of the goby family (*Gobiidæ*), are also known as sea-dragons.

Sea-eagle, a name applied to one or two members of the eagle family; but probably with most distinctive value to the cinereous or white-tailed eagle or erne (*Haliaëtus albicilla*), found in all parts of Europe. It is generally found inhabiting the sea-coasts, and although living mainly upon fish, yet makes inland journeys in search of food, and seizes lambs, hares, and other animals. The head is covered with long drooping feathers of ashy brown color, while the body is of a dark-brown hue, streaked in some places with lighter tints, and having the primary feathers of the wing mostly black. The tail is rounded, and is of white color in the adult, but brown in the young bird. The bird breeds in Shetland and in the Hebrides. Its average size appears to be about 3 feet in length, and from 6 to 7 feet in expanse of wings. The American bald-headed eagle (*Haliaëtus leucocephalus*) from its frequenting the sea-coasts is also named the sea-eagle. See *Eagle.*

Sea-ear. See *Haliotis.*

Sea-egg, the sea-urchin. See *Echinus.*

Sea-elephant. See *Elephant-seal.*

Seaford (sē'furd), a small town of England, in the county of Sussex, 3 miles S.E. of Newhaven, now a popular seaside resort. Pop. 4787.

Sea-fox. See *Thresher.*

Sea-grape, a genus of plants, *Ephedra*, nat. order Gnetaceæ, closely allied to the conifers. The species consist of shrubs with jointed stems, whence they are also called *Joint-firs.*

Sea-grass. See *Grass-wrack.*

Seaham Harbor (sē'am), a seaport of England, county of Durham, 6 miles S. of Sunderland, has an excellent harbor for the shipping of coal. Pop. 15,759.

Sea-hare (*Aplysia*), the name of a genus of gasteropodous mollusca. These animals are slug-like in appearance, and derive their popular name from the prominent character of the front pair of tentacles, which somewhat resemble the ears of a hare. The shell is either absent or is of very rudimentary character, and is concealed by the mantle. Four tentacles exist, and the eyes are situated at the base of the

Depilatory Sea-hare (*Aplysia depilans*).

hinder tentacles. The sea-hares are widely distributed throughout most seas, and generally inhabit muddy or sandy tracts. They emit a fluid of a rich purple hue, which, like the ink of the cuttle-fishes, has the property of diffusing itself quickly throughout the surrounding water. They are also known to discharge an acrid fluid of milky appearance, which has an irritant effect on the human skin, and in the case of *A. depilans* was thought to have the property of removing hair.

Sea-hedgehog. See *Echinus.*

Sea-hog. See *Porpoise.*

Sea-horse. See *Hippocampus* and *Lophobranchii.*

Sea-kale (*Crambe maritĭma*), a perennial cruciferous herb, a species of colewort, called also *sea-cabbage.* It is a native of the sea-coasts of Europe, and is much cultivated in gardens as a table vegetable, the blanched young shoots and leaf-stalks being the parts eaten.

Sea-king. See *Viking.*

Seal (sēl), an engraved stamp bearing a device or inscription pertaining to the owner; also, the impression of such a stamp on a plastic substance as wax. A seal upon a document was originally a substitute for a signature; a seal upon a place of deposit answered the purpose of security in a different manner from a lock. The use of seals is of the highest

antiquity, and one of the earliest and commonest forms is the signet-ring. In Egypt impressions of seals were made in fine clay, and attached to documents by slips of papyri. The Romans used clay, bees'-wax, and in the time of the empire lead for taking impressions. In the time of Constantine flat metal seals called *bullæ* were used. The metals used were gold, silver, and lead, and the bullæ were attached to documents by silk or woolen bands. The leaden seal was adopted by the popes. (See *Bull.*)

Attitudes of the Fur Seal in the Water.
Breathing. Sleeping. Scratching.

The western monarchs generally used bullæ up to the sixteenth century. The use of bees'-wax was introduced by the Normans; sealing-wax was invented in the seventeenth century (See *Sealing-wax.*) Documents in England are still sealed in compliance with legal formality, but the true voucher to which alone any real importance attaches is the signature. There are three seals officially used in England — the great and privy seals, and the signet. The United States government and the several States have seals, each with a distinctive device or legend. The attestation of deeds and other documents by a notary's seal stamped upon the paper is customary.

Seal, the name applied collectively to certain genera of mammals, order Carnivora, section Pinnipedia or Pinnigrada, in which the feet exist in the form of swimming-paddles. Two distinct groups of seals are defined by zoologists, the *Phocidæ*, or common or true seals, and the *Otaridæ*, or eared seals.

The *Phocidæ*, the true or hair seals, have a body of fish-like contour. They have no external ear, and the hind limbs are permanently stretched out behind the body and parallel with the tail, a conformation obviously inappropriate and unsuited for supporting the body for locomotion on land, but admirably adapted for swimming. Five toes exist on each foot, and the middle digits of the hinder feet are much shorter than the outer ones. The toes, which are provided with claw-like nails, are united by a web of skin, and so form effective swimming paddles. The fore limbs are mere flippers. The dentition resembles that of carnivora generally. The fur generally consists of a dense thick underfur and of an outer coat of longer and coarser hairs. The bones are of light spongy texture, and beneath the skin is a thicker layer of blubber or fat. The eyes are large and intelligent, and the sense of smell is also well developed. The sense of touch appears to reside chiefly in the 'whiskers' of the face. The brain is of large size in proportion to the body, and when domesticated seals

Old Male Fur-Seal.

exhibit a very high degree of intelligence. They are polygamous, and seldom produce more than two young at birth, one being the common number. They occur almost in all seas except those of tropical regions. In the northern regions they are more especially plentiful. They are largely hunted for their skins, which are converted into leather, and for their blubber, from which a valuable oil is obtained. The common seal (*Phoca vitulina*) is found widely throughout the northern seas. Its average length is from 3 to 5 feet, and the fur is a grayish-brown, mottled with black. It is very destructive to most of the food fishes. It is much attached to its young, and is strongly attracted by musical sounds. It is never met with in large numbers, or far away from the land. Closely allied to the common seal is the marbled seal (*P. discolor*), met with on some of the European coasts. The harp seal, Greenland seal, saddleback, or atak (*Phoca greenlandica*), inhabits almost all parts of the Arctic Ocean. The males average 5 feet in length, are colored of a tawny gray, and on the back there is a dark mark resembling a harp or saddle in shape. In the spring, at breeding season, these seals resort in immense herds to the floes of the Arctic Ocean, around Jan Mayen Island, where great numbers of them are killed annually by crews of the sealing vessels. The great seal (*Phoca barbāta*), which measures 8 or 10 feet in length, occurs in Southern Greenland. The gray seal (*Halichœrus gryphus* or *griseus*), attains a length of from 8 to 9 feet, and is found on the Scandinavian and Icelandic coasts. The *P. caspica*, found in the Caspian Sea, and also in the Siberian lakes Aral and Baikal, attains a length of about 5 feet. The genus *Stenorhynchus* is represented by several species of the Southern Seas, and by the monk seal (*S. monăchus*) of the Mediterranean, which attains a length of from 10 to 12 feet, and seems to have been the seal best known to the ancients. The genus *Cystophŏra* includes the large bladder-nose, hooded or crested seal (*C. cristāta*) of the Greenland seas, in which the nose of the males has a curious distensible sac, and which attains an average length of from 10 to 12 feet. It also includes the large sea-elephant, elephant-seal, or bottle-nosed seal (*C.* or *Morunga proboscidea*) of the Anarctic Seas, which attains a length of from 20 to 30 feet. See *Elephant-seal.*

Common Seal (Adult and Young)
(*Phoca vitulina*).

The *Otaridæ* or 'eared' seals are distinguished by the possession of a small outer ear, which is absent in the *Phocidæ*, by a longer neck, better developed limbs, and a structural relationship which presents a much nearer affinity to that of the bears. Of these the northern sea-lion (*Eumetopias* or *Otaria Stelleri*), so-called from the mane of stiff crisp hairs on its neck and shoulders, is a native of the Pribyloff Islands and other parts of Alaska. The sea-bear or fur seal extends south of the equator from near the tropics to the Antarctic regions. It was very abundant at the

Falkland Islands early in the nineteenth century, but has almost been exterminated there. It is now sought for chiefly at St. Paul's and St. George's Islands, of the Pribyloff group, off the coast of Alaska, and at the Commander Islands in the Behring Sea. The species found here is the northern fur seal (*Callorhīnus ursīnus* or *Otaria ursīna*). It visits those islands, making its appearance from the southward late in the spring, chiefly for reproductive purposes, leaving again about the end of October or beginning of November. Each old male mates with ten or fifteeen or more females, whom he guards jealously, and in whose behalf he fights furiously. The female gives birth to one pup. The male attains maturity about the eighth year, when its length is from 7 to 8 feet, and its weight from 500 to 700 lbs. The outer and longer hairs of its fur are of a grayish-brown color, the thicker under-fur being darker or reddish-brown; and it is this fine under-fur which, when stripped of the coarse outer hairs and dressed by the furrier, affords one of the most beautiful and valued of the 'sealskins' of commerce.

The seal fisheries are divided into hair-seal fisheries and fur-seal fisheries. The principal seats of the hair-seal fishery are Newfoundland, Jan Mayen and the Caspian Sea. Nearly half the total number of seals obtained is taken on the Newfoundland coast. The Jan Mayen fishery is carried on by the British, Norwegians, Swedes, Danes and Germans, the number of seals taken by the British vessels being about equal to that taken by all the others together. The only British ports now engaged in the industry are Dundee and Peterhead. Steamers are employed, and the vessels make the ice about the middle of March, and prosecute the seal fishing till about the middle of May, when they proceed to the whale fishing. The seals are taken either by clubbing them or shooting them when congregated on the ice. The species taken are the same as those on the Newfoundland coast, the harp or saddle-back and the hood or bladder-nose. The skins are salted, and the fat is stowed into tanks, and manufactured into oil when the vessels reach home in the autumn. The blubber of about 100 seals yields a tun of oil. Owing to the reckless way in which the fishery has been conducted seals have greatly diminished in numbers of late years in localities where they were formerly plentiful; but a 'close season' has now been established both in the Newfoundland fishery and the Jan Mayen fishery. The fur-seal fishery is carried on chiefly at St. Paul's and St. George's Islands, Pribyloff Islands, Alaska, and Commander Islands, Behring Sea, all which were leased in 1870 by the Alaska Commercial Company of San Francisco, and in 1890 by the North American Fur-Sealing Company. It is also carried on at the Straits of Juan de Fuca, at the Lobos Islands, mouth of Rio de la Plata, at the South Shetland Islands and Straits of Magellan, and at the Cape of Good Hope. The indiscriminate killing of fur seals in the open seas by vessels chiefly from Canada, led to a controversy between the United States and the British governments, the practice of ocean fishing becoming so destructive that there was serious danger of annihilation of the seals. Fortunately the difficulty has been adjusted, Canada and Japan receiving part of the profits of the fisheries for their abstention from this destructive process. The sealing company is not allowed to take more than 100,000 skins annually, and this from young males, the old males and the females being preserved for breeding purposes.

Seal, GREAT, a seal used for the United Kingdom in sealing the writs to summon parliament, treaties with foreign States, and other papers of high moment. The lord-chancellor is keeper of the great seal. The United States has a great seal of similar character in charge of the Secretary of State. Its device is an American eagle, with the shield on its breast, in its right talon an olive branch, in its left a bundle of 13 arrows, and in its beak a scroll with the inscription *E Pluribus Unum*. On the reverse is an unfinished pyramid and above it an eye, a Latin inscription surrounding.

Sea-lemon (*Doris*), a genus of gasteropodous mollusca, section Nudibranchiata ('naked-gilled'), family Doridæ. It is destitute of a shell, and moves by means of a broad ventral foot. The gills exist in the form of a circle of plumes in the middle of the back, at the posterior extremity of the body, and can be retracted at will within the body. The name sea-lemon has been applied to these molluscs from their usually yellow color and somewhat lemon-like shape. They may be found at low-water mark under stones and in similar situations. *Doris tuberculata*, or the 'sea-lemon' *par excellence*, is about 3 inches in length, of a yellow color, and having the mantle warty.

Sealing-wax, a resinous preparation used for securing folded

papers and envelopes, and for receiving impressions of seals set to instruments. Ordinary red sealing-wax is made of pure bleached lac, to which when melted are added Venice turpentine and vermilion. Inferior qualities consist of a proportion of common rosin and red-lead, and black and other colors are produced by substituting appropriate pigments. Sealing-wax was invented in the seventeenth century.

Sea-lion. See *Seal.*

Seal Islands. See *Lobos.*

Sealkote, or SIALKOT, a town of India in the Punjab, 72 miles northeast of Lahore, is the scene of a famous annual fair, and a local trade center of rising importance. The manufactures are paper and cloth. Pop. (including military cantonment), 57,956.

Seal-leather, a leather manufactured from sealskins. It is light, strong and tough, and is finished either in a large coarse grain for bootmakers, or as an enameled or japanned leather.

Sea-mat, or HORNWRACK (*Flustra*), a genus of Molluscoida, class Polyzoa (which see). The sea-mat, which presents the appearance of a piece of pale brown sea-weed, is a compound organism, produced by a process of continuous gemmation or budding from a single primitive polypide, which latter was in turn developed from a true egg. Each little polypide or zoöid of the sea-mat possesses a mouth surrounded by a crown or circle of retractile, ciliated tentacles, a stomach, and intestine. *Flustra foliacea*, or the broad hornwrack, is a familiar species, as also are *F. truncata*, *F. denticulata*, etc.

Seamen, LAWS RELATING TO. In the American merchant service shipping articles are agreements in writing or print between the master and seamen or mariners on board of his vessel (except such as shall be apprenticed or servant to himself or owners), declaring the voyage or voyages, and the term of time for which such seamen or mariners shall be shipped. It is also required that at the foot of every such contract there shall be a memorandum, in writing, of the day and the hour on which each seaman or mariner, who shall so ship and subscribe, shall render himself on board to begin the voyage agreed upon. In default of shipping articles the seaman is entitled to the highest wages which have been given at the port or place where such seaman or mariner shall have been shipped for a similar voyage, within three months next before the time of such shipping, on his performing the service, or during the time he shall continue to do duty on board such vessel without being bound by the regulations, or subject to the penalties or forfeitures contained in act of Congress; and the master is further liable to a penalty. Shipping articles ought not to contain any clause which derogates from the general rights and privileges of seamen; and if they do the clause will be declared void. A seaman who signs shipping articles is bound to perform the voyage, and he has no right to elect to pay damages for non-performance of the contract. In the British service laws closely similar to these are in use.

Sea-mouse (*Aphroditē*), a genus of dorsibranchiate Annelids or marine worms. The most notable feature in connection with the sea-mouse consists in the beautiful iridescent hues exhibited by the hairs or bristles which fringe the sides of the body. The sea-mouse inhabits deep water, and may be obtained by dredging, although it is frequently cast up on shores after storms.

Seance (sā-aṇs), in spiritualism, a sitting with the view of obtaining 'manifestations,' or holding intercourse with the alleged spirits of the departed.

Sea-otter. See *Otter.*

Sea-pass, a passport carried by neutral vessels in time of war to prove their nationality, and so secure them from molestation.

Sea-pen. See *Pennatula.*

Sea-perch, a fish, *Labrax lupus.* See *Bass.*

Sea-pike. See *Gar-fish.*

Sea-pink (*Armeria maritima*), a small plant, the type of the genus *Armeria*, nat. order Plumbaginaceæ, found on European coasts. The thrift (*Armeria vulgāris*) is found in the sea-waters of the Middle and Southern States, near the coast.

Search, RIGHT OF, in maritime law, the right claimed by a nation at war to authorize the commanders of their lawfully commissioned cruisers to enter private merchant vessels of other nations met with on the high seas, to examine their papers and cargo, and to search for enemy's property, articles contraband of war, etc.

Search-light, an electric arc-light of great candle-power, arranged with a parabolic reflector so

that the rays are sent almost wholly in one direct line, forming a path of light which may be projected for miles. A chief purpose is for use on war vessels, enabling the officers to detect the approach of an enemy in the dark and to guard against torpedo boats. They are also used for signaling, and on land for exhibition and advertising purposes. They have been made powerful enough for the light to be seen nearly 100 miles away.

Search-warrant, in law, a written authority granted by a magistrate to a legal officer to search a house or other place for property alleged to have been stolen and suspected to be secreted in the place specified in the warrant. Similar warrants are granted to search for property or articles in respect of which other offenses are committed, such as base coin, coiners' tools, explosives, liquors, etc., kept contrary to law.

Sea-scorpion. See *Scorpion-fish.*

Sea-serpent, a marine serpentine form of large size, or sea-monster of doubtful character, frequently alleged to have been seen. From the numerous substantiated accounts of animals of one kind or another, but differing from all described and known forms, having been seen, often close at hand, by the crews and passengers of ships, and by respectable observers on land, we are restricted to the choice either of believing that in every case the senses of the observers must have been mistaken, or that some living form must have been seen in the majority of cases. Careful research, and the weighing of the evidence presented in the accounts of 'sea-serpent' phenomena, show that the subject demands, at least, investigation, though very little credit is placed in the existence of any such animal. See *Kraken, Sea-snake.*

Sea-shore, in law, signifies the strip surrounding a coast between high and low water mark.

Sea-sickness, the name given to the nausea and other disagreeable sensations produced on those unaccustomed to a sea-faring life by the rolling motion of a vessel at sea. The exact causes and etiology of this complaint are as yet imperfectly understood. Some observers have referred the malady to causes entirely dependent upon the altered or affected functions of the nervous centers; others to the regurgitation of bile into the stomach; and others, again, to the irritation of the liver consequent on the unusual movements of the body. Probably all three views contain a certain amount of truth. The measures which have been suggested for sea-sickness are preventive or curative. Preventive measures, so far as the construction of the *vessels themselves* are concerned, have not proved of much practical utility. Preventive measures, regarded from the *patient's* point of view, are practically limited to the regulation of the diet, which for some days previously to undertaking the voyage should be plentiful, but of light and nutritious character. The bowels should not be constipated above all things; and food should not be taken for at least five or six hours before going on board. A cup of strong coffee, swallowed just before embarking, proves beneficial to some as a nerve stimulant; while others derive benefit from a nerve sedative, such as bromide of potassium, chloral, or opium; but these, especially the two last, should never be used save under strict medical direction. Nitrite of amyl and cocaine have also been used. Once on board the ship, a position as near the center of the vessel as practicable is to be preferred, and the posture in lying should be that on the back, with the head and shoulders very slightly elevated. With reference to *curative* measures, during the attack of nausea and vomiting, some derive benefit from a bandage applied moderately tight across the pit of the stomach; some from small doses of brandy and ice; some from saline effervescing drinks; and some from frequent draughts of lukewarm or even cold water.

Seaside Grape, a small tree of the genus *Coccoloba* (*C. uvifera*), nat. order Polygonaceæ, which grows on the sea-coasts of Florida and the West Indies. It has clusters of edible fruit somewhat resembling the currant in appearance, and a beautiful hard wood which produces a red dye, and yields the extract known as *Jamaica kino.*

Sea-slug, a name applied generally to Sea-lemons (which see) and other gasteropodous molluscs destitute of shells, and belonging to the section Nudibranchiata.

Sea-snake, a name common to a family of snakes, Hydridæ, of several genera, as *Hydrus, Pelamis, Chersydrus,* etc. These animals frequent the seas of warm latitudes. They are found off the coast of Africa, and are plentiful in the Indian Archipelago. They are all, so far as known, exceedingly venomous. They delight in calms, and are fond of eddies and tide-ways,

Sea-snake (*Hydrus Stokesii*).

where the ripple collects numerous fish and medusæ, on which they feed. The *Hydrus Stokesii* inhabits the Australian seas, and is as thick as a man's thigh.

Sea-snipe. See *Bellows-fish.* The name Sea-snipe is also given to the Dunlin (which see).

Seasons (sēz'nz), the four grand divisions of the year — spring, summer, autumn, winter. These have distinctive characters, best seen in the temperate zones. Within the tropics they are not so much marked by differences of temperatures as by wetness and dryness, and are usually distinguished as the wet and dry seasons. Astronomically speaking, spring is from the vernal equinox, when the sun enters Aries, to the summer solstice; summer is from the summer solstice to the autumnal equinox; autumn is from the autumnal equinox to the winter solstice; winter is from the winter solstice to the vernal equinox. In common acceptation winter consists in the three months beginning with December, spring in those beginning with March, summer with June, and autumn with September; but the tendency now is to replace this with the astronomical reckoning. The characters of the seasons are reversed to inhabitants of the southern hemisphere. See *Spring, Summer, Autumn, Winter;* also *Climate, Earth, Equinox,* etc.

Sea-spider, or SPIDER-CRAB, a marine crab of the genus *Maia* (*M. squinado*). Its body is somewhat triangular in shape, and its legs are slender and generally long. It lives in deep water, and is seldom seen on the shore.

Sea-squirts, a name sometimes applied collectively to all the Tunicata, or more especially to the genus *Ascidia* (see *Ascidia*). The name 'sea-squirts' has been applied from their habit of emitting jets of water from the orifices of the body when touched or irritated in any way.

Sea-surgeon, or SURGEON-FISH (*Acanthūrus chirurgus*), a fish belonging to the teleostean section of Acanthopteri, so named from the presence of a sharp spine on the side and near the extremity of the tail, bearing a resemblance to a surgeon's lancet. It occurs on the Atlantic coasts of South America and Africa, and in the Caribbean seas. Its average length is from 12 to 19 inches.

Seattle (sē-at'l), metropolis of Pacific Northwest and county seat of King Co., Washington, situated on the east side of Puget Sound. Seattle is beautifully located. Its chief heights afford a magnificent view of Mt. Rainier, the Olympic and Cascade mountain ranges. The harbor is one of the largest and the deepest landlocked ports in the United States. Washington State customs district was second to New York in 1918 in value of foreign trade; total, $597,180,914. Washington customs district, of which Seattle is headquarters, handled 52.8 per cent of entire Pacific Coast foreign commerce for year ending June 30, 1919. Due to location and the great circle of navigation, it is the nearest U. S. port to China, Japan, Philippines and Siberia and is the gateway to Alaska. Direct steamship lines, both freight and passenger, are maintained to these countries as well as freight service to ports of the seven seas. Seattle has numerous industrial establishments, such as shipyards, foundries, machine shops, mills, meat packing, fish canning, etc. The chief exports are coal, lumber, meat, fruit, wheat and hops. Center of intensive dairying and berry raising. Pop. (1900) 80,671; (1910) 237,194; (1920) 315,652.

Sea-unicorn, a popular name given to the narwhal (which see).

Sea-urchin. See *Echinus.*

Sea-water, the salt-water of the sea or ocean. Sea-water contains chlorides and sulphates of sodium (chloride of sodium = common salt), magnesium, and potassium, together with bromides and carbonates, chiefly of potassium and calcium.

Sea-weed, any plant growing in the sea; but the name is usually confined to members of the nat. order Algæ (which see).

Seawell, MOLLY ELLIOT, author, was born in Gloucester Co., Virginia, in 1860; died Nov. 15, 1916. She began a literary career in 1886, and in 1890 her *Little Jarvis* won a prize of $500 offered for the best story for boys. Other prizes won by here were $3000 for her *Sprightly Romance of Marsac* (1890) and $1000 for *John Mainwaring, Financier* (1908). Among her novels are *The Victory* (1906), *The Secret of Toni* (1907), and *Last Duchess of Belgrade* (1908).

Sea-wolf (*Anarrhichas lupus*), a genus of teleostean fishes, section Acanthopteri, family Blenniidæ or blennies (also known by the names 'sea-cat' and 'swine-fish'). The mouth is armed with sharp, strong teeth of large size, and when captured it is said to bite the nets and even attack the fishermen. It is the largest of the blennies, growing to a length of over 6 feet. The flesh is palatable, and is largely eaten in Iceland, while the skin is durable, and is manufactured into a kind of *shagreen*, used for making pouches and like articles. See also *Bass*.

Sebaceous Glands (se-bā'shus), small structures of glandular nature and sacculated form which exist in the substance of the *corium*, or deeper layer of the dermis or true skin, and secrete a fatty matter. They are very generally distributed over the entire skin surface, but are most numerous in the face and scalp. Those of the nose are of large size, but the largest in the body are those of the eyelids — the so-called *Meibomian glands*. They appear to be absent from the skin of the palms of the hands and soles of the feet. Each sebaceous gland consists essentially of a lobulated or sac-like structure, with cells which secrete the sebaceous or glutinous humor, and with a single efferent duct; and these ducts open into the hair-follicles, or sac-like involutions of the skin which surround and inclose the roots of hairs, or simply on the external surface of the skin. The functions of the sebaceous secretion are chiefly those of keeping the skin moist.

Sebastes (se-bas'tez), a genus of acanthopterygious fishes, containing the bergylt or Norway haddock. See *Bergylt*.

Sebastian (sa-bast'yan), Dom, King of Portugal, posthumous son of the Infant John and of Joanna, daughter of Charles V, was born in 1554, and ascended the throne in 1557, at the death of his grandfather, John III. In 1578 he led the flower of his nobility into Africa on a wild expedition against the Moors, and perished in battle with nearly all his followers. He had no immediate heir, and Portugal was soon annexed by Philip II of Spain, but the masses of the people refused to believe in his death, and several pretenders to his name and claims received a measure of popular support. The belief in the future return of Dom Sebastian lingered long in Portugal, finally taking the form of a myth, and giving rise to a considerable literature of poems and romances.

Sebastian, San. See *San Sebastian*.

Sebastian, St., a Christian martyr, was born at Narbonne, and under Diocletian was captain of the prætorian guard at Rome. He rose to high favor at court, but declaring himself a Christian, and refusing to abjure, he was tied to a tree and pierced with arrows. A Christian woman named Irene, who came by night to inter his body, finding signs of life in him, took him home, and nursed him till he recovered. He then presented himself before Diocletian, and remonstrated with him on his cruelty; whereupon the emperor ordered him to be beaten to death with rods (January 20, 288), and his body to be thrown into the cloaca. His protection was invoked against pestilence, and his martyrdom has been a favorite subject with painters.

Sebastiano del Piombo. See *Piombo*.

Sebastopol (sē-bas'tō-pōl), a Russian town and naval station on the Black Sea, in the southwest of the Crimea. The town lies chiefly on the south side of a large and deep inlet of the Black Sea running east for a distance of nearly 4 miles, with an average width of ¾ mile narrowing to 930 yards between the promontories at its mouth,

and a depth of from 6 to 10 fathoms. There are also smaller inlets from the main harbor penetrating southward at the town itself. Sebastopol has grown up since 1780, when it was a mere Tartar village. On the outbreak of the Crimean war, when the population amounted to 43,000, it became the point against which the operations of the allies were mainly directed, and its siege forms

one of the most remarkable episodes in modern history. (See *Crimean war.*) The town, then utterly destroyed, has been reconstructed, and though the treaty of Paris stipulated that no arsenal should exist on the Black Sea, and that the town should not again be fortified, these obligations have been repudiated by Russia, and it bids fair to exceed its former importance. Railway communication with Moscow has greatly improved the trade. There are many new important public buildings, and the monuments and relics of the siege are interesting. Pop. 77,000, largely military.

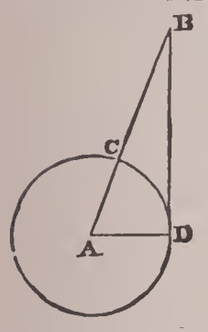
Sebenico (sā-bā′nē-kō), a town in Dalmatia on Sebenico Bay, in the Adriatic, near the mouth of the Kerka, between Zara and Spalato. It is the seat of a bishop, and its Italian Gothic cathedral, of the fifteenth and sixteenth centuries, is considered the finest church in Dalmatia. It has an excellent harbor, and is the entrepôt of a considerable trade. Pop. 24,751.

Sebesten (se-bes′ten), the *Cordia myxa* and *latifolia*, Asiatic trees of the borage order. The fruit is edible, and was formerly employed in European medicine, but now only by the practitioners of the East. It is mucilaginous and somewhat astringent.

Secale (se-kā′le), the genus which contains rye.

Secamone (se-ka-mō′ne), a genus of plants, nat. order Asclepiadaceæ, found in the warm parts of India, Africa, and Australia. The species form erect or climbing smooth shrubs, and some of them secrete an acrid principle which makes them useful in medicine. The roots of *S. emetica* are employed as a substitute for ipecacuanha.

Secant (sē′kant), in trigonometry, a straight line drawn from the center of a circle, which, cutting the circumference, proceeds till it meets with a tangent to the same circle; as the line A B C in the figure, which is a secant to the arc C D. In the higher geometry it signifies the straight line which cuts a curve in two or more points.



Secaucus (sē′cạ-kus), a town of Hudson Co., New Jersey, 3 miles N. W. of Jersey City. Pop. (1920) 5423.

Secchi (sek′kē), Angelo (1818-78), an Italian astronomer, was born at Reggio in Lombardy, June 29, 1818; entered the order of Jesuits in 1833, and was director of the observatory of the Collegio Romano at Rome (1849-78). Father Secchi gained a great reputation by his astronomical researches, especially by his meteorological observations and spectroscopic analyses both of stars and of the sun.

Secession (se-sesh′un), the right of a State included under the Constitution of the United States to withdraw from the Union and set up an independent government. This has been attempted twice in American history, once in 1832, when a convention in South Carolina voted in favor of seceding from the Union if the tariff was enforced within the State; and again in 1860-61 when eleven of the Southern States sought to break away from the Union. The result of the Civil war was so decisive that secession is hardly likely to be again attempted.

Sechuen. See *Sze-chuen.*

Seckendorf (sek′en-dorf), Friedrich Heinrich, Count von, imperial field-marshal, born in 1673 at Königsberg, in Franconia; died in 1763. After studying law at Jena, Leipzig, and Leyden, he adopted the military profession, and served against the Turks under Prince Eugene, and in the war of the Spanish Succession. On the death of Prince Eugene, 1736, he became commander-in-chief of the Austrian army against the Turks, but being unsuccessful, was recalled, tried by court-martial, and imprisoned in the fortress of Gratz, from which he was liberated in 1740. He then took service with the elector of Bavaria, who had just been elected as Charles VII, emperor of Germany, and as commander of the Bavarian forces relieved Munich and drove back the Austrians into Bohemia. On the emperor's death in 1745 he himself set negotiations on foot for establishing a peace; whereupon he was reëstablished by the new emperor Francis I, husband of Maria Theresa, in all the honors he had at an earlier period obtained.

Second (sek′und), in the measurement of time and of angles, the 60th part of a minute; that is, the second division next to the hour or degree. In old treatises seconds were distinguished as *minutæ secundæ*, from *minutæ primæ*, minutes.

Second Adventists, a general name given to several slightly different Protestant sects, all of which believe in the visible reappearance of Christ at some time in the future. They include the Evangelical Adventists, the Advent Christians, the Seventh Day Adventists, and others,

the total membership in the United States being less than 100,000, the Seventh Day Adventists numbering about 60,000.

Secondary Formations, in geology, the Mesozoic strata, midway, in ascending order, between the Primary or Palæozoic below and the Tertiary or Kainozoic above. They range from the top of the Permian Formation to the base of the Eocene, and include, therefore, the Trias, Lias, Oölitic, and Cretaceous Formations.

Second Sight (in Gaelic, *taisch*), a Highland superstition, formerly very common, which supposed certain persons endowed with the power of seeing future or distant events as if actually present. These visions were believed to be not as a rule voluntary, but were said to be rather dreaded than otherwise by those who were subject to them; yet it was also believed that those who possessed this gift might sometimes induce visions by the performance of certain awful rites. The subject is treated at length in Martin's *Description of the Western Islands of Scotland* (1703); Macleod of Hamir's *Treatise on the Second Sight* (1763); and is discussed also in Dr. Johnson's *Journey to the Hebrides* (1775).

Secret (sē'kret), in the Roman Catholic Church, the prayer of the mass which follows immediately after the oblation of the bread and wine, and which is recited by the priest in so low a voice as not to be heard by the people.

Secret Service, United States, a bureau connected with the Treasury Department, designed originally to guard against the counterfeiting of money. Its scope has been considerably widened and it has come to be an important agent of government in the detection of plots of alien governments in the United States. The arrest of numerous German spies in this country during the European war was effected by the Secret Service. Other nations have similar organizations.

Secretary (sek're-ta-ri), the name given to the heads of departments, or members of the President's cabinet, in the United States government, with the exception of the Attorney-General and Postmaster-General. It is also applied to various members of the British cabinet, as Secretary of State for the Home Department, Secretary for Foreign Affairs, etc.

Secretary-bird, the sole representative of the genus *Serpentarius* (*S. secretarius*, also called *Gypogerănus serpentarius*), order Accipitres or birds of prey. It derives its popular name from the peculiar plumes of feathers which project from the back and sides of its head, and give it the appearance of having bundles of pens stuck behind each ear. It has very long legs, and stands nearly 4 feet in height. The wings are elongated, and carry a blunt spur on the shoulder, the third, fourth, and fifth quills being the longest. The tail is also very long, and wedge-shaped, the two middle feathers projecting beyond the others. The tibiæ are feathered all the way down. The

Secretary-bird (*Serpentarius secretarius*).

skin around the eyes is destitute of feathers. The general color is a slaty gray, the pen-like feathers of the head being black, as also are the feathers of the tibiæ and the primaries of the wings. The secretary-bird can fly with ease when once it takes wing, but it seems to prefer the ground. It is found over the greater part of Africa, especially in the south. It derives its generic name from its habits of destroying serpents, striking them with its knobbed wings and kicking forward at them with its feet until they are stunned, and then swallowing them. As a foe to venomous snakes it is encouraged and protected in South Africa, where it is frequently brought up tame.

Secretion (se-krē'shun), in animal physiology, is the separation of certain elements of the blood, and their elaboration to form special fluids, differing from the blood itself or from any of its constituents, as bile, saliva, mucus, urine, etc. Secretion is performed by organs of various form and structure, but the most general are those called glands. Of these glands the essentially active parts are the cells, which elaborate from the blood a peculiar fluid, in each instance predetermined by the inherent function of the gland or organ of which the cells are integral parts. The chief general conditions which variously affect secretion are the quantity

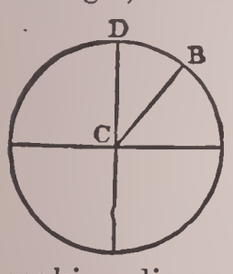
and quality of the blood traversing the gland and the influence of the nervous system. Mental conditions alone, without material stimuli, will excite or suppress secretion; but this is a branch of the subject which is yet ill-understood. Animal secretions have been arranged into — (1) *Exhalations*, which are either external, as those from the skin and mucous membrane, or internal, as those from the surfaces of the closed cavities of the body and from the lungs; (2) *Follicular secretions*, which are divided into mucous and cutaneous; and (3) *Glandular secretions*, such as milk, bile, urine, saliva, tears, etc.

Secretion, in vegetable physiology, is the separation of certain elements from the sap, and their elaboration by particular organs. These secretions are exceedingly numerous, and constitute the great bulk of the solid parts of plants. They have been divided into (1) *General* or *nutritious secretions*, the component parts of which are gum, sugar, starch, lignin, albumen and gluten; and (2) *Special* or *non-assimilable secretions*, which may be arranged under the heads of acids, alkalies, neutral principles, resinous principles, coloring matters, milks, oils, etc.

Secret Writing. See *Cryptography.*

Section (sek'shun), a representation of a building or other object as it would appear if cut through by an intersecting plane, showing the internal structure. The term is also applied to the details of structure.

Sector (sek'tur), in geometry, a part of a circle comprehended between two radii and the arc; a mixed triangle, formed by two radii and the arc of a circle; as C D B in the accompanying figure. The term denotes also a mathematical instrument so marked with lines of sines, tangents, secants, chords, etc., as to fit all radii and scales, and useful in making diagrams, laying down plans, etc. The sector is founded on the fourth proposition of the sixth book of Euclid, where it is proved that equiangular triangles have their homologous sides proportional.



Secular Clergy (sek'ū-lar), in the Roman Catholic Church, clergy of all ranks and orders not bound by monastic vows. Those who live according to any rule or order are known as the regular clergy. See *Clergy.*

Secular Games, a great festival, probably of Etruscan origin, anciently celebrated at Rome to mark the commencement of a new *sæculum* or generation. In 249 B.C. it was decreed that the secular games should be celebrated every hundredth year after that date; but this decree was frequently disregarded, and they were celebrated at very irregular intervals.

Secularism, a philosophy of life, the gist of which consists in the advocacy of free thought and the assertion of some corollaries derived from this leading tenet. Secularists are convinced that the best means of arriving at the truth is to place perfect confidence in the operations of human reason. They do not hold human reason to be infallible, but they maintain that it is in the interest of truth that reason should be corrected only by reason, and that no restraint whatever, penal, moral, or social, should be placed upon holding, expressing, or acting up to any opinion intelligently formed and sincerely held, however contrary that opinion may be to those generally current. Skepticism or the questioning of traditional beliefs they regard as a moral duty, yet their creed cannot be called a skeptical one, for they do not rest satisfied with doubting, but when they find that certainty, that is, irresistible conviction, is unattainable on any subject, they consider that they should confess their ignorance with regard to it, and pass on to other subjects that may be investigated with more profitable results. From the nature of their leading tenet it follows that the only moral principles they can hold are such as they believe must commend themselves to the reason and aspiration of every man of enlightened conscience. The foundation of such a set of moral principles they profess to find in the doctrine of Utilitarianism, which regards it as our highest duty to do all that tends to bring every individual to the highest perfection of which human nature is capable. The means to do this is, they think, most likely to be found in the study of man's whole nature, physical, moral, and intellectual, and of the laws of external nature, and these are the objects to which they direct attention. Secularism does not come into direct collision with any religion. It is not atheistic, inasmuch as it is no tenet of that system either to affirm or deny the existence of God; nor does it deny the truth of Christianity, for that is none of its business any more than it is to affirm or deny some scientific theory. Secularism in England is an offshoot of the socialism

of Robert Owen, but its immediate founder is George Jacob Holyoake, a native of Birmingham, where he was born in 1817, and began to promulgate his views about 1846. It is to him that British legislation is chiefly indebted for the Evidence Amendment Act, which legalized affirmations in lieu of oaths. Mr. Charles Bradlaugh, Mr. Holyoake's successor in the leadership of the English secularists, carried this question a step further by his refusal to take the parliamentary oath and by his Oaths Bill of 1888.

Secularization (sek-ū-lar-i-zā'-shun), in its most general sense, is the conversion of objects from a religious or spiritual to a common or secular use; specifically, it is the act of rendering secular the property of the clergy. Secularization took place in Germany in 1648, and again in 1801; in England under Henry VIII; in Italy in 1866, and again in 1873; and in France during the Revolution.

Secunderabad (sē-kun-der-ä-bäd'), or SIKANDARABAD (*Alexander's Town*), a British military cantonment in India, in the Nizam's Dominion, 6 miles northeast of Hyderabad. It is the largest military station in India, covering a total area of 19 square miles, including many interspersed villages, and forms the headquarters of the Hyderabad subsidiary force, which constitutes a division of the Madras army. Pop. 83,550.

Secundra, a town in the United Provinces, India. Pop. 18,290.

Sedaine (sė-dān), MICHEL JEAN, a French dramatist, born at Paris in 1719; died in 1797. He is regarded as the founder of comic opera. Two of his comedies, *Le Philosophe sans le Savoir* and *La Gageure Imprévue*, still hold the stage, and are ranked among the best French plays.

Sedalia (sė-dā'li-a), a city, capital of Pettis county, Missouri, 189 miles west of St. Louis, is a railroad center and has extensive railroad shops, iron-foundries, meat and poultry packing establishments, breweries, woolen mills, etc. Coal, lead and zinc are abundant in the vicinity. Pop. (1920) 21,144.

Sedan (sė-dāṇ), a town in France, department of Ardennes, on the Meuse, on the frontiers of Luxemburg. The staple industry is the manufacture of fine black cloth. There are also flour mills and factories for machinery. Here, on September 2, 1870, Napoleon III and his army of 100,000 men surrendered to the Germans in the Franco-German war (q. v.). In 1918. the closing year of the European war (q. v.), American troops, after an irresistible advance, gained the heights above Sedan and were ready to march into the historic town on the day the armistice was signed, November 11, 1918, bringing the great war to an end. The Sedan of 1870 marked the birth of German militarism. The Sedan of 1918 marked its death. In the advance on Sedan the first and second divisions of the American First Army led the way. The famous Rainbow division made the most savage thrust of the action, pursuing the foe for ten miles and sweeping the Freya Hills clear of machine-gun nests and German artillery. The last action of the war for the Americans followed immediately on the heels of the battle of Sedan. It was the taking of the town of Stenay. General Pershing in his report described the action as "an impetuous onslaught that could not be stayed." Sedan had a population of 19,520 in 1914.

Sedan (se-dan'), a closed automobile with single compartment for passengers and driver.

Sedan, or SEDAN-CHAIR, a portable covered chair for carrying one passenger, borne by two men by means of a pole on either side.

Sedative (sed'a-tiv), a medicine that moderates the excessive action of an organ or organic system. Digitalis, for example, is a sedative of the action of the heart and the circulatory system; and gum-resins are sedatives that act on the nervous system. Besides these aconite, chloroform, conium, carbonic acid and prussic acid are among the principal sedatives.

Sedge (sej; *Carex;* nat. order, Cyperaceæ), an extensive genus of grass-like plants, containing thousands of species, mostly inhabiting the northern and temperate parts of the globe. The greater proportion of the species are marsh plants. The stems are usually triangular, without joints. The sedges in general are but of little utility to man. They furnish coarse fodder, which is rejected by most of the domestic quadrupeds. The decomposed roots and leaves contribute largely to turn the soil of marshes into peat.

Sedgemoor (sej'mör), a marshy tract in Somersetshire, England, about 5 miles southeast of Bridgwater. In 1685 it was the scene of the battle in which the Duke of Monmouth was defeated by the troops of James II.

Sedge-warbler (*Salicaria phragmitis*), a species of insessorial birds of the warbler family, which frequent the sedgy banks of rivers

More than fifty species of warblers are found in the United States.

Sedgley (sej'li), UPPER, a town of Staffordshire, England, 3 miles S. of Wolverhampton, of which it is practically a suburb. It has extensive collieries and iron-works, with manufactures of rivets, nails, chains, fire-irons, locks, safes, etc. Pop. 16,529.

Sedgwick (sej'wik), ADAM, an English geologist, born at Dent, Yorkshire, in 1785; died at Trinity College, Cambridge, January 27, 1873. He was educated at Sedbergh and Trinity College, Cambridge, and in 1818 was appointed Woodwardian professor of geology in his own university, and this chair he held till within a short time of his death. His chief services to geology consisted in the determination of the geological relations of the palæozoic strata of Devon and Cornwall, and of those strata afterwards called Permian in the northeast and northwest of England, in the explanation of the geological character of North Wales, and not less in the enlargement of the geological museum at Cambridge. The only considerable work of Professor Sedgwick's in a *Discourse on the Studies of the University of Cambridge*, which had a wide circulation.

Sedgwick, CATHERINE MARIA, an American writer, was born at Stockbridge, Massachusetts, in 1789; died in 1867. She conducted a private school for the education of young ladies for fifty years. She published her first work of fiction, *A New England Tale*, in 1822, and two years later brought out *Redwood*, which was compared favorably with the novels of Cooper and translated into several European languages. Other works of hers were: *The Traveler*, *Hope Leslie*, *Clarence*, *The Story of Le Bossu*, *The Linwoods*, *Letters from Abroad*, *Historical Sketches of the Old Painters*, etc. She was a prolific writer, and contributed much to the annuals and magazines.

Sedilia (se-dil'i-a), in architecture, stone seats in the south wall of the chancel of many cathedrals and churches. They are usually three in number, for the use of the priest, the deacon, and subdeacon during part of the service of high mass.

Sedimentary Rocks, rocks which have been formed by materials deposited from a state of suspension in water. See *Geology*.

Sedition (se-di'shun), a term in English law including all offenses against the crown and government which do not amount to treason, and are not capital, as seditious libels, seditious meetings, seditious conspiracies. The offenses classed under the head of sedition are of the same general character with those called treason, but are without the overt acts which are essential to the latter. The punishment of sedition in Great Britain, formerly arbitrary, is now restricted to fine and imprisonment. The term *sedition* has now scarcely a place in the law language of the United States. It is in use in the statutes in connection with army and navy regulations, naming sedition as a military offense.

Sedley (sed'li), SIR CHARLES, one of the 'wits' of the Restoration period, and a great favorite with Charles II, was born at Aylesford, Kent, in 1639; died in 1701. He was educated at Oxford. He wrote comedies and songs; of the latter one or two are still popular, but the former are not equal to his reputation. His first comedy, *The Mulberry Garden*, was published in 1668. In later life he entered parliament, and took an active part in politics. He uniformly opposed the unconstitutional policy of James II, and was one of the chief promoters of the Revolution.

Seduction (se-duk'shun), in law, the act of persuading a female, by flattery or deception, to surrender her chastity. English law does not give a right of action either to the woman seduced or to her parents or guardians; it only gives a right of action for seduction as occasioning loss of service; but the word 'service' is interpreted with the greatest liberality, and damages are estimated not only with reference to the loss of service, but also to the distress and dishonor brought upon the woman's family by her seducer. By the law of Scotland an action for seduction is competent to a husband against the seducer of his wife, and to an unmarried woman against her own seducer, but she must show that deceit was used towards her. In neither country is seduction a criminal offense. The statutory rule which prevails widely in the United States rests both the right and remedy where the wrong is inflicted, in the family and parental relations. The action is therefore brought in the case of an unmarried woman by the parent (or guardian) as the head of the family, and in the case of a married woman by the husband.

Sedum (sē'dum), a genus of plants, nat. order Crassulaceæ. It comprises about 120 species, chiefly found in Europe and Asia and mostly per-

ennial herbs, erect or prostrate, with succulent leaves of varied form, but never compound, and with flowers usually cymose, and of a white, yellow, or pink color. They are natives of the north temperate, and cold regions, and are often found on rocks, walls, and dry banks, where nothing else will grow, many of the species being remarkable for prolonged vitality under adverse circumstances. The British species are known by the common name of *stonecrop*. Of these the most striking are *S. Telephium* and *S. album* (white stonecrop), both used formerly in medicine, and eaten cooked or as a salad, and *S. acre* (biting stonecrop or wall-pepper), also used formerly in medicine. *S. telephioïdes* and *S. ternātum* are American species.

See (sē), a word derived (through the French) from the Latin *sedes*, a seat, and properly applied to the seat or throne of a bishop, but more usually employed as the designation of the city in which a bishop has his residence, and frequently as that of the jurisdiction of a bishop, that is, as the equivalent of diocese. See *Diocese*.

See, Thomas Jefferson Jackson, astronomer, born near Montgomery City, Missouri, in 1866. He was graduated from the University of Missouri in 1889 and from Berlin in 1892. He has been engaged in astronomical work since 1887, was connected with the Yerkes and the Lowell observatories, and in 1899 became professor of mathematics in the Naval Academy and took charge of the 26-inch telescope in the Naval Observatory. Since 1903 he has been at the Naval Observatory, Mare Island, Cal. His astronomical work has been of much importance, and he has published many papers and books on the subject.

Seed (sēd), the impregnated ovule of a plant. It consists essentially of two parts, namely, the nucleus or kernel, and the integuments. The latter consists of two seed-coats — the outer named the *episperm* or *testa*, the inner the *tegmen* or *endopleura;* and the two together are sometimes termed the *spermoderm*. The testa of some seeds is furnished with hairs, which cover the entire surface, as in various species of *Gossypium*, where they constitute the material called cotton; or they may be confined to certain points of the surface, as in willow, Epilobium, etc.; while in the pine the testa forms a wing. On the outside of the integument of the seed there is sometimes an additional partial covering, which has received the name of *aril*, and in the nutmeg forms the mace. The nucleus or kernel of the seed is the fully developed central portion of the ovule. It consists either of the embryo alone, as in the wall-flower, or of the embryo along with a separate deposit of nourishing matter called albumen, as in the cocoa-nut, wheat, etc. The embryo is the young plant contained in the seed, and is the part to the development of which all the reproductive organs contribute. It consists of a general axis, one part of which is destined to form the root, the other to form the stem. The axial portion is provided with fleshy

Various forms of Seeds magnified.

1, Eschscholtzia californica. 2, Corn Bluebottle (*Centaurèa Cyānus*). 3, Oxālis rosea. 4, Opium Poppy (*Papāver somnifĕrum*). 5, Stellaria media. 6, Sweet-william (*Dianthus barbātus*). 7, Foxglove (*Digitālis purpurèa*). 8, Saponaria calabrica.

organs called cotyledons or seed-leaves, which serve to nurse the young plant before the appearance of the true leaves. Plants possessing one cotyledon are termed monocotyledonous, those having two are denominated dicotyledonous, and plants having only a cellular embryo, as in the cryptogamic or flowerless plants, are called acotyledonous. When seeds are contained in an ovary, as is usually the case, the plants are called *angiospermous;* when the seeds are not contained in a true ovary, with a style or stigma, the plants are called *gymnospermous*, as conifers. See *Botany*.

Seed Lac. See *Lac*.

Seeland. See *Zealand*.

Seeley (sē'li), John Robert, an English scholar and writer, was born in 1834 in London, where his father was a publisher, and was educated at the City of London School and at Christ's College, Cambridge. In 1863 he was appointed professor of Latin in University College, London; and in 1869 he succeeded Charles Kingsley in the chair of modern history at Cambridge. In 1865 appeared a work, *Eeee Homo, or the Life and Work of Jesus Christ*, of which Professor Seeley has always been regarded

as the author. It created a profound sensation at the time of its appearance; but *Natural Religion* (1887), by the author of *Ecce Homo*, attracted much less attention. Among Professor Seeley's avowed works are *Life and Times of Stein, or Germany and Prussia in the Napoleonic Age* (1879); *The Expansion of England* (1883); and *A Short Life of Napoleon the First* (1886). He published a volume of miscellaneous contents under the title *Lectures and Essays*. He died January 13, 1895.

Seer (sēr), the standard measure of weight in India, but varying in different parts of the country. The imperial or standard seer is 2.205 lbs., exactly equivalent to the metrical kilogram; it is the fortieth part of a maund. As a standard liquid measure the seer is equal to about 6 gills.

Seggar. See *Pottery*.

Segment (seg'ment), in geometry, a part cut off from a circle or a sphere by a line or a plane.

Segni (sen'yē), a town of Italy, in the province and 40 miles southeast of Rome. One of the oldest Italian cities, it contains some interesting remains of antiquity, such as fragments of cyclopean walls, and an ancient gate. The cathedral is a very fine building. Pop. 6994.

Segno (sen'yō), in music, a sign placed over a note from which a portion of a piece is to be repeated.

Sego, or Segoo (sā'gö), the capital of a Fulah kingdom of the same name (now in the French 'sphere of influence'), in the Bambarra country, Western Africa, on the Upper Niger. The kingdom consists mainly of an alluvial plain of great fertility on the right bank of the river, extensively flooded during the rainy season. The capital is surrounded by earth-walls, and has two-storied white mud houses with flat roofs. Pop. of town about 10,000.

Segorbe (sā-gor'bā), a town in Spain, 29 miles N. N. W. of Valencia, on the Palancia, has a cathedral, and manufactures of earthenware and paper. Pop. 7232.

Segovia (sā-gō'vē-ä), a town in Spain, capital of the province of the same name, on a lofty rock, washed by the Eresma and Clamores, 43 miles northwest of Madrid. It is surrounded by walls flanked with round towers, and in the middle ages was a great royal and religious center. The chief objects of interest are the ancient Alcazar or fortress, the fine Gothic cathedral, and the aqueduct of Trajan. Pop. 14,547.—The province, area 2713 square miles, is watered by streams which rise in the Guadarrama range and flow northward to the Douro. The inhabitants are for the most part employed in agricultural and pastoral pursuits. Pop. 159,243.

Segu. See *Sego*.

Seguidilla (seg-i-dēl'yȧ), a Spanish form of versification, consisting of four lines, generally assonant lines, of seven and five syllables alternately. It usually has a close of three verses, called *estribillo*, of which the first and last lines rhyme.

Seguin (sė-gaṇ), Edouard, born in France in 1812, studied medicine and surgery, devoted himself specially to the study of idiocy and the training of idiots, settled in the United States after the revolution of 1848, and died there in 1880. He achieved remarkable results in his treatment of idiots, and his writings on the subject hold the position of text-books.

Ségur (sā-gür), Joseph Alexandre, Comte de, born at Paris in 1752; died in 1805; was the author of several comedies and operas, some of which still remain popular.— His brother, Louis Philippe, Comte de Ségur-d'Aguesseau, born in 1753; died in 1830; served in America under Rochambeau, and after the peace of 1783 was ambassador to St. Petersburg. In 1792 he was sent to Berlin; but after the execution of the king he retired from public affairs. In 1803 he was chosen a member of the Academy, and Napoleon appointed him one of the council of state. After the restoration he was received into the Chamber of Peers. His principal works are: *Théâtre de l' Hermitage*, originally written for the private theater of Catherine II; *Tableau historique et politique de l'Europe de 1786 à 1796; Histoire Ancienne; Histoire Romaine;* and *Mémoires.*— His son, Philippe Paul, Comte de Ségur (born 1780; died 1873); was a general of the first empire, and accompanied Napoleon I in his Russian campaign. He wrote *Histoire de Napoléon et de la Grande Armée pendant l'Année 1812* (1824), and left an extensive collection of *Mémoires*.

Seidlitz Powders (sīd'litz, or sed'litz), an aperient medicine, named after the Seidlitz spa in Bohemia. These powders are usually put up in a blue and a white paper, the blue containing tartrate of soda and potash (Rochelle salt) with bicarbonate of soda, and the white tartaric acid. The former is dissolved in half a tumbler of water, and the acid powder is then

added, which produces effervescence, and the draught is taken while the effervescence is going on.

Seigniorage (sēn'yor-āj), an ancient royalty or prerogative of the British crown whereby it claimed a percentage upon the bullion brought to the mint to be coined or to be exchanged for coin. No seigniorage is now charged for coining gold in Britain, but a considerable seigniorage is levied upon the silver and copper currencies.

Seine (sen or sān; ancient *Sequăna*), a river in France, which rises on the Plateau de Langres, dep. of Côte-d'Or, 20 miles northwest of Dijon. It flows generally in a northwest direction; receives on the right the Aube, Marne and Oise, and on the left the Yonne and Eure; passes the towns of Chatillon, Troyes, Corbeil, Paris, St. Denis, St. Germain, Poissy, Mantes, Elbœuf, Rouen, Quillebœuf, and, after a somewhat tortuous course, falls into the English Channel between Honfleur and Havre. Its total length is 480 miles, and 250 miles in a direct line; and its basin has an area of about 30,000 square miles. It is navigable from its junction with the Aube at Marcilly; vessels of 9 to 10 feet draught can reach Paris, below which it has been deepened by recent works; and vessels of 20 feet draught can reach Rouen, where the navigation for sea-going ships terminates. There is a 'bore' of from 8 to 10 feet at every tide; and the estuary, which commences at Quillebœuf, is impeded by sand-banks. The Seine is connected by canals with the Loire, Sâone, Scheldt and Rhine.

Seine (sān), a department in France, completely inclosed by the department of Seine-et-Oise, and at once the smallest and most populous of the French departments, including as it does the city of Paris. Area, 185 sq. miles; pop. 3,848,618. The department has 3 arrondissements (Paris, St. Denis, and Sceaux), 28 cantons (20 in Paris), and forms the archiepiscopal diocese of Paris.

Seine (sān), a large net for catching such fish as mackerel and pilchard. It is often 160 to 200 fathoms long, and 6 to 10 broad, and is buoyed by corks and weighted so as to float perpendicularly.

Seine-et-Marne (sen-e-mārn), a French department in the basin of the Seine and Marne, east of Seine-et-Oise. Area, 2215 sq. miles; pop. 361,939. Cereals occupy two-fifths of the department, and forests (the most important of which is the forest of Fontainebleau) one-fifth. There are quarries of excellent building stone, and beds of common clay and porcelain clay, which supply the potteries of Fontainebleau and Montereau. Agriculture is a most thriving industry. The capital is Melun.

Seine-et-Oise (sen-e-wäz), a French department, in the basin of the Seine and Oise, inclosing the department of Seine. Area, 2163 sq. miles; pop. 749,753. Seine-et-Oise is a great agricultural and horticultural department, with numerous industrial establishments, including the national porcelain factory at Sèvres. There are valuable quarries of building stone, pavement, millstones, and extensive beds of porcelain and potters' clay. The capital is Versailles.

Seine-Inférieure (sen-aṇ-fā-ri-*eur*), a maritime department of France, on the English Channel, south of the estuary of the Seine. Area, 2330 sq. miles; pop. 863,879. The department is in general fertile and well cultivated, the principal crops being oats, wheat and potatoes. There are numerous apple orchards, and vast quantities of cider are made. Manufactures are extensively carried on, Rouen being the seat of the cotton trade and Elbœuf of the woolen trade. Havre, Rouen, and Dieppe are the principal ports for foreign trade. Tréport, Dieppe, St. Valery, Fécamp, Etretat, etc., are fashionable watering-places. The coast fisheries are productive. The capital is Rouen.

Seir-fish (sēr), a fish of the mackerel family (*Cybium Guttatum*), which occurs in East Indian seas. In size, form, and the flavor of its flesh it bears a close resemblance to the salmon.

Seisin, SEIZIN (sē'zin), in law, possession of the freehold. Seisin is of two sorts, seisin in deed or fact, and seisin in law. Seisin in deed or fact is actual or corporal possession; seisin in law is when something is done which the law accounts seisin, as enrolment, or when lands descend to an heir but he has not yet entered on them.

Seismology (sīs-mol'ō-ji), the science which treats of volcanoes and earthquakes.

Seismometer (sīs-mom'e-ter), an instrument for measuring the force and direction of earthquakes and other earth movements. It records both the horizontal and vertical movements by means of an index, the record being traced on smoked glass. There are various forms of seismometer or seismograph. One which is used in the observatory on Mount Vesuvius consists

of a delicate electric apparatus, which is set to work by the agitation or change of level of a mercurial column, which records the time of the first shock, the interval between the shocks, and the duration of each; their nature, whether vertical or horizontal, the maximum intensity; and in the case of horizontal shocks the direction is also given.

Seistan (sās-tän), a swampy tract between Afghanistan and Persia.

Sejanus (se-jā'nus), AELIUS, the son of a Roman knight, and noted as the favorite of Tiberius, was born at Vulsinii in Etruria. He was commander of the prætorian bands, acquired the confidence of Tiberius, and aimed at the supreme power. He contrived to remove all the members of the imperial family who stood between him and power, but having awakened the suspicion of Tiberius, he was executed in A.D. 31.

Selachii (se-lā'ki-ī), that section or group of the elasmobranch fishes which specially includes the sharks and dog-fishes.

Selaginella (sel-a-ji-nel'a), a genus of club-mosses, readily distinguished from the genus *Lycopodium* by their flat two-ranked stem. They are mostly natives of warm climates, and being often very elegant are objects of cultivation.

Selangor (sā-län-gōr'), a native state of the Malay peninsula, south of Perak, under the protection of the British colony of the Straits Settlements; area, 3000 square miles. It yields tin, gutta-percha, etc. Since 1880 the British resident resides at Kwala Lumpur, 22 miles distant from Klang, the principal port, with which it is connected by railway. The sultan resides at Jugra. Pop. 168,789, more than half of whom are Chinese.

Selborne (sel'born), ROUNDELL PALMER, first Earl of (1812-95), an English lawyer and statesman, born at Mixbury, Oxford, educated at Rugby, Winchester and Oxford. He was a member of parliament in 1847 and 1853, became a Q. C. in 1849 and attorney-general, 1863-66. He advised the ministry in the controversy regarding the seized ship in the American Civil war. He also represented Great Britain in the negotiations arising from the claims of the United States following the war. In 1872 he was made a peer and became Lord Chancellor. He was the principal author of the Judicature Act of 1873. He broke with Gladstone on the questions of disestablishment of the Church of Ireland and Home Rule.

Selborne, WILLIAM WALDEGRAVE PALMER, second earl of (1859-), son of the preceding. He was under-secretary for the Colonies, 1895-1900; First Lord of the Admiralty, 1900-05; Governor of Transvaal and High Commissioner for South Africa, 1905-10.

Selby (sel'bi), a market town of England, in the West Riding of Yorkshire, 14 miles south of York, on the Ouse, here navigable for vessels of 200 tons; has excellent communications by railway and canal, and is the seat of a considerable trade and of a number of miscellaneous manufactures. Selby is the center of a rich agricultural district. The magnificent parish church formed part of an abbey of Benedictine monks, founded in 1068 by William the Conqueror. Pop. (1911) 9049.

Selden (sel'den), JOHN, a distinguished jurist, legal antiquary, and Oriental scholar, was born in 1584 at Salvington, near Worthing, Sussex, where his father held a small farm, and was educated at the free grammar-school, Chichester, and at Hart Hall, Oxford, whence he proceeded to London to Clement's Inn and the Inner Temple. On being called to the bar he practiced principally as a chamber counsel, devoting his leisure to the study of constitutional history. The fruits of his studies he gave to the world in several valuable works, including the *Analecton Anglo-Britannicon*, a treatise on the civil government of Britain before the coming of the Normans: *Janus Anglorum, Facies altera* (1610), a treatise on the progress of English law down to Henry II; and *Titles of Honour* (1614), still a standard authority in regard to all that concerns the degrees of nobility and gentry in England. His *De Diis Syriis* (1617), on Syrian mythology, at once established his fame as an Oriental scholar; and his *History of Tithes* (1618) brought him into collision with the clergy. In 1621 he suffered a short imprisonment for having advised the House of Commons to resist King James's claim that their privileges were derived from royal grants; in 1628 he aided in drawing up the *Petition of Right;* and the following year he was again committed to the Tower, remaining in prison a considerable time. After his liberation he published a celebrated work, *Mare Clausum* (1635), upholding the rights of England to sovereignty over the 'narrow seas.' In 1640 he sat in the Long Parliament for the University of Oxford, and espoused the popular cause, but with great moderation. He sat as a lay member of the Westminster Assembly (1643), was named one of the parliamentary commissioners of the admiralty (1645), subscribed the

Solemn League and Covenant (1646), and was voted £5000 by parliament in recompense of his losses and as a reward for his services to the state. He died in 1654, and was buried in the Temple Church, London. His *Table Talk* was published in 1689 by his amanuensis, Richard Milward.

Selection, NATURAL. See *Natural Selection.*

Selectmen (sel-ekt'men), in New England, officers chosen annually to manage the affairs of a town, provide for the poor, etc. A town has usually from three to seven selectmen, who constitute a kind of executive authority.

Selenē (se-lē'nē), in Greek mythology, the goddess of the moon, daughter of Hyperion, and sister of Helios (the sun) and Eos (the dawn). She was also called Phœbe, and in later times was identified with Artemis. In art she is often represented as a beautiful woman with large wings, a long robe, and a coronet.

Selenite (sel'e-nīt), crystallized native sulphate of calcium. See *Gypsum.*

Selenium (se-lē'ni-um), a rare chemical element discovered by Berzelius in 1817 in the refuse of a sulphuric acid manufactory near Fahlun, in Sweden. It occurs in several minerals, chiefly in combination with copper, lead, mercury and silver, and is closely related, in its general chemical deportment, to sulphur and tellurium, these three elements forming a group which is characterized by certain well-marked general properties. Selenium takes fire when heated to a tolerably high temperature in air or in oxygen, burning with a blue flame, and with the production of the dioxide SeO_2. With hydrogen selenium forms the very disagreeably smelling gas *seleniurcttcd hydrogcn* (H_2Se), the analogue of sulphuretted hydrogen. To selenium the symbol Se and the atomic weight 96.5 are given.

Seleucia (sē-lū'shi-a), the name of several cities in Asia, founded by Seleucus Nicator. The most celebrated was Seleucia-on-the-Tigris, the eastern capital of the Seleucidæ, about 80 miles from Babylon. It was one of the richest commercial cities of ancient times, counting about 600,000 inhabitants, chiefly Greeks. Taken by the Parthians 140 B.C., and sacked by Trajan 116 A.D., it was soon deserted, and became as desolate as Babylon itself. The next in importance was Seleucia Pieria, founded 300 B.C., and situated on the sea-coast at the foot of Mount Pieria, 12 miles west of Antioch, of which it was the seaport, and which it rivaled in splendor.

Seleucidæ (se-lū'si-dē), a dynasty of kings who succeeded to that portion of the empire of Alexander the Great which embraced the Asiatic provinces, and is generally known as Syria.— SELEUCUS I, surnamed *Nicator*, the founder of the line, was born about 358 B.C., and was a general of Alexander the Great, shortly after whose death (323 B.C.) he obtained the satrapy of Babylon. Subsequently Antigonus forced him to withdraw into Egypt (316 B.C.), but having induced Ptolemy, the governor of Egypt, along with Lysimachus and Cassander, to take the field against Antigonus, he was enabled to return to Babylon in 312 B.C. He gradually extended his possessions from the Euphrates to the Indus, assumed the title of king in 306, and afterward acquired Syria and the whole of Asia Minor, but was assassinated in 280 B.C. He is said to have been the most upright of Alexander's successors, and was the founder of Antioch and other cities. He was succeeded by his son Antiochus I and by a number of monarchs of the name of Seleucus and Antiochus, the most distinguished being Antiochus the Great. (See *Antiochus.*) The power of the Seleucidæ began to decline as early as the reign of Seleucus II (246-226 B.C.), and they successively lost, through revolts and otherwise, Bactria, Parthia, Armenia, Judea, etc., and what subsequently remained was converted into a Roman province in 65 B.C.

Selim I (sē'lim), Sultan of Turkey, was the son of Bajazet II, born in 1467; died in 1520. The people, pleased with his warlike disposition, raised him to the throne in place of Bajazet, who was afterwards poisoned, as were also the brothers and nephews of Selim. In 1514 he entered upon a war with Persia and obtained large accessions of territory. He next directed his arms against the Mamelukes of Egypt, and in 1516-17 became master of Syria and Egypt. The title of *imam* and the standard of the Prophet were at this time granted to Selim by the last descendant of the Abasside Caliphs in Egypt, and in consequence the sultans of Constantinople became the chiefs of Islam, the representatives of Mohammed. Selim was succeeded on the throne by Solyman I.

Selim III, Sultan of Turkey, son of Mustapha III, was born in 1761; assassinated in 1808. He suc-

ceeded his uncle Abdul-Hamed in 1789, and attempted reforms in his government after European methods, but wars with Russia, Austria, etc., prevented their being carried out. In 1791 Selim was compelled to cede Choczim to Austria, and a year later he signed the Peace of Jassy, by which Russia acquired all Turkish possessions beyond the Dniester. Selim entered with great ardor upon his system of reforms; but the fanatic zeal of the people, kindled by the preaching of the dervishes, burst into open revolt, and he was deposed by the Janizaries (1807). An attempt to regain his throne ended in his murder. Selim's efforts for the reformation of Turkey were not altogether fruitless, for manufactures had begun to flourish, and generally a number of improvements calculated greatly to benefit the nation effected.

Selinus (se-lī'nus), one of the most important of the Greek colonies in Sicily, founded probably about 628 B.C. on the southwestern coast of that island. Thucydides mentions its great power and wealth, and the rich treasures of its temples. It was conquered by the Carthaginians in 409, and in 249 destroyed by them. There are still important ruins of ancient Greek temples here, and valuable sculptures belonging to them have been preserved.

Seljuks (sel'jukz), a Turkish family deriving its name from Seljuk, chief of a small Turkish tribe which had gained possession of Bokhara and the adjoining neighborhood in the ninth century of our era. The most powerful of the various dynasties they founded in Mesopotamia, Persia, Syria, and Asia Minor during the eleventh and twelfth centuries were: — (1) The Seljuks of Iran or Bagdad, and Ispahan. The founder, Togrul-Beg, grandson of Seljuk, completed the conquest of Persia about 1061. His notable successors were Alp-Arslan (1063-73), Melek-Shah (1073-93), Mohammed-Shah (1105-18), and Sanjar (1118-58). This dynasty became extinct in 1194 with Togrul-Shah, who was vanquished by Tekesh, sultan of Kharizm.— (2) The Seljuks of Kerman, who ruled the three provinces of Kerman. Their dynasty, founded by Kaderd, nephew of Togrul-Beg, ended in 1091.—(3) The Seljuks of Aleppo, in Syria, founded in 1079, and became extinct in 1114.—(4) The Seljuks of Damascus, founded in 1096 by Dekkah. His successors reigned till 1155.—(5) The Seljuks of Iconium, or of Asia Minor, founded by Solyman-ben-Kutulmish, who was granted a territory in Asia Minor by the Sultan Kalek-Shah. During the reign of Alla-ed-Din II, one of the last princes of this dynasty, the Turk Osman distinguished himself as chief captain. His descendants founded the dynasty of Osman in Asia Minor. The Seljuk Empire then fell under Mongol domination. See *Ottoman Empire*.

Selkirk (sel'kirk), a burgh of Scotland, county-town of Selkirkshire, on an eminence overlooking Ettrick Water, 39½ miles S.S.E. of Edinburgh. It is substantially built, and has a town-hall, and monuments to Sir Walter Scott and Mungo Park. The staple industry is the manufacture of tweeds. In the vicinity is Philiphaugh, where the Covenanters under Leslie routed the forces of Charles I under Montrose. Pop. 6292.— SELKIRK, or SELKIRKSHIRE (formerly known as *Ettrick Forest*), is an inland county, bounded by Midlothian, Roxburgh, Dumfries, and Peebles; area, 257 sq. miles. It is generally hilly, with heights ranging from a few hundreds to 2000 feet, and affording excellent pasturage. Large numbers of sheep are reared, the Cheviots being now the prevailing breed. The chief river is the Tweed, with its tributaries Ettrick and Yarrow. Among interesting historical scenes in the county are the field of Philiphaugh; Oakwood Towers, the reputed residence of Michael Scott, the wizard; and Newark Castle, the scene of Scott's Lay of the last Minstrel. Other places of interest are St. Mary's Loch and the Loch of the Lowes, midway between which is the monument to the Ettrick Shepherd. Woolens are largely manufactured, chiefly in Selkirk, the capital of the county, and in Galashiels. Pop. 23,356.

Selkirk, or SELCRAIG, ALEXANDER, the prototype of 'Robinson Crusoe,' was born in Largo, Fifeshire, in 1676; died on board the royal ship *Weymouth*, 1723. He took part in bucaneering expeditions in the South Seas, and in consequence of a quarrel with his captain he was put ashore, at his own request, on the island of Juan Fernandez. There he lived alone for four years and four months, when he was taken off by the captain of a privateer. He returned home in 1712, and his adventures became known to the public. Defoe's *Robinson Crusoe* appeared in 1719, but Crusoe's experiences have but little in common with those of Selkirk. Selkirk afterwards rose to the rank of lieutenant in the navy. A monument was erected to him in his native town in 1885.

Selma (sel'mȧ), a city, capital of Dallas county, Alabama, on the

Alabama River, 50 miles w. of Montgomery. It is the center of a large cotton-growing region, and has extensive cotton and oil mills, railroad repair-shops, etc. During the Civil war it was an important military station. Pop. 15,607.

Seltzer Water (selt'zėr; a corruption of Selters), a mineral water found naturally in the village of Niederselters, in the German province of Hesse-Nassau, and elsewhere, but also largely manufactured. Its chief ingredients are carbonic acid, carbonate of soda, and common salt. It acts as a mild stimulant of the mucous membranes, and as a diuretic.

Selvas (sel'vas), or SILVAS, great tracts of low flat land, covered with dense vegetation and forest trees, which occur along the course of the river Amazon in South America.

Semaphore (sem'a-fōr; Greek, *sēma*, 'a signal,' and *pherō*, 'I bear'), a term originally applied to telegraphic or signaling machines, the action of which depended upon the motion of arms round pivots placed at or near their extremities. Many kinds of semaphores were in use before the invention of the electric telegraph, and a simple form is still employed on railways to regulate traffic at or near stations.

Semaphore Plant. See *Moving Plant.*

Semecarpus (sem-e-kar'pus), a small genus of Asiatic and Australian trees, nat. order Anacardiaceæ. See *Marking-nut.*

Semele (sem'e-lē), in Greek mythology, a daughter of Cadmus by Harmonia, and beloved by Zeus. Jealous of her husband's mistresses, Hera persuaded Semele to entreat her lover to attend her with the same majesty as he approached Hera. As he had sworn to gratify her every wish, Zeus, though horrified at this request, came to her accompanied by lightnings and thunderbolts, when Semele was instantly consumed by fire. Dionysus (Bacchus) was her son by Zeus.

Semendria (sē-men'drē-a), or SMEDEREVO, a town in Servia, on the Danube, 22 miles S. E. of Belgrade. It is imperfectly fortified, poorly built, and rendered unhealthy by the proximity of swamps. Pop. 6912.

Semibreve (sem'i-brēv), in music, a note of half the duration or time of the breve. The semibreve is the measure note by which all others are now regulated. It is equivalent in time to two minims, or four crotchets, or eight quavers, or sixteen semiquavers, or thirty-two demi-semiquavers. See *Music.*

Semicolon (sem'i-kō-lun), in grammar and punctuation, the point (;), the mark of a pause to be observed in reading or speaking, of less duration than the colon, and more than that of the comma. It is used to distinguish the conjunct members of a sentence.

Seminoles (sem'i-nōlz), a tribe of North American Indians, an offshoot from the Choctaw Muskogees. They separated from the Confederation of the Creeks, and settled in Florida in 1750, under the name of Seminoles, that is, fugitives. They were subsequently joined by other Indians as well as negroes, and in 1822 they numbered 3900 souls. As a punishment for their continual plundering and murdering of the white settlers, General Jackson was sent against them in 1818. They subsequently sold their lands and agreed to be transferred beyond the Mississippi, but they refused to fulfill their agreement, and under their chief Osceola carried on a long and determined resistance. In 1842 they were finally driven from the Everglade morasses and obliged to succumb, when all but a scanty remnant were transferred to the Indian Territory, where they now form an industrious community of 2500 souls.

Semipalatinsk (sā-mē-pà-là-tyensk'), or SEMIPOLATINSK, a fortified town of Siberia, on the Irtish. It consists chiefly of wooden buildings facing the river, and carries on a considerable trade with the Kirghiz and with Tashkend Khokand, Bokhara, and Kashgar. Pop. 35,121.—The province of Semipalatinsk has an area of 198,192 square miles, and a population of 685,197, chiefly Kirghiz, Cossacks, etc. It is mountainous in the southeast, consists of steppe land in the northwest, and is one of the warmest regions of Russian Asia in summer, though the winter is rather extreme. The chief occupation of the people is cattle-rearing.

Semiquaver (sem'i-kwā-ver), in music, a note half the length of the quaver. See *Music.*

Semiramis (se-mir'a-mis), a fabulous queen of Assyria. As the story goes, she was a daughter of the fish-goddess Derceto of Ascalon, in Syria, by a Syrian youth. Being exposed by her mother, she was miraculously fed by doves until discovered by the chief of the royal shepherds, who adopted her. Attracted by her beauty, Onnes, governor of Nineveh, married her. She accompanied him to the siege of Bactra, where, by her advice, she as-

sisted the king's operations. She became endeared to Ninus, the founder of Nineveh (about B.C. 2182), but Onnes refused to yield her, and being threatened by Ninus, hanged himself. Ninus resigned the crown to Semiramis, and had her proclaimed queen of Assyria. She built Babylon, and rendered it the mightiest city in the world. She was distinguished as a warrior, and conquered many of the adjacent countries. Having been completely defeated on the Indus, she was either killed or compelled to abdicate by her son Ninyas, after reigning forty-two years. According to popular legend she disappeared or was changed into a dove, and was worshiped as a divinity. She is probably a mythological being corresponding to Astarte, or the Greek Aphroditē.

Semiryechensk (sā-mē-re-chensk'), a province of Russian Turkestan close to the Chinese frontier; area 155,300 square miles. It is mountainous in the south, but the northern part is flat and barren. Large herds of cattle are reared by the inhabitants, and agriculture is more or less developed in the southern district. Pop. 1,080,700. —The chief town is VERNOYE, which has an increasing trade with Kuldja and Kashgar.

Semites (sem'īts), the name given a group of natives closely allied in language, religion, customs and physical features, inhabiting Southwestern Asia and Northeastern Africa; so called from the Scriptural passage speaking of them as descended from Shem, the son of Noah. They dwell in Arabia, Syria, Abyssinia, and the countries of the Euphrates and Tigris.

Semitic Languages (se-mit'ik), the languages belonging to the Semites or Semitic peoples, that is, those regarded as descendants of Shem. The Semitic languages form an important linguistic family, which is usually divided into a northern and a southern section. To the northern belong the ancient dialects of Assyria and Babylonia (recovered by means of the cuneiform inscriptions); the Hebrew, with the Samaritan and Moabitic; the Phœnician and Carthaginian; and lastly the Aramaic, which includes the Chaldee and the Syriac. The northern Semitic languages are now almost entirely extinct as spoken tongues, though Hebrew is to some extent still used in writing. The most important of the south Semitic tongues, and the only one now in extensive use, is the Arabic, which as a spoken language may be divided into the four dialects of Arabia, Syria, Egypt, and Barbary. To this branch also belong the Himyaritic, formerly spoken in part of Arabia, the Ethiopic, or ancient ecclesiastical language of Abyssinia, and the Amharic and other modern dialects of the same country. The most prominent characteristic of the Semitic tongues is the triliteralism of their roots, that is, the peculiarity that their roots regularly consist of three consonants which always remain unchanged, the various words and word forms being produced by the insertion of vowels between the consonants of the root. Another peculiarity is the absence of compound words. See *Philology*.

Semlin (zem-lēn'), a frontier town of Hungary, near the junction of the Save and Danube, and almost opposite the Servian city of Belgrade. It carries on an important transit trade. Pop. 15,079.

Semmering (zem'er-ing), a mountain of Austria, 4575 feet high, on the borders of Styria and Lower Austria, 44 miles S. W. of Vienna. It is crossed by the Semmering Railway, the first of the mountain railways in Europe. The railway is carried along the face of precipices, through fifteen tunnels, and over sixteen viaducts, the surrounding scenery being magnificent. It was constructed at a cost of £1,000,000 for the Austrian government, between 1848 and 1853.

Semmes (semz), RAPHAEL, an American naval officer, born in 1809; died in 1877. He entered the navy in 1832, having previously studied law; took part in the Mexican war, and on the outbreak of the Civil war joined the Confederate service, and gained much prominence from his feats in command of the *Sumter* and the *Alabama*. (See *Alabama*.) He was imprisoned after the war, but gained his liberty at the amnesty. The rest of his life was devoted to law practice. He was the author of *Service Afloat and Ashore*, *Cruise of the Alabama and Sumter*, etc.

Semnopithecus (sem-nō-pith-ē'kus), a genus of Old World monkeys, to which belong the Entellus monkey (*Semnopithēcus Entellus*) and the proboscis monkey (*S.* or *P. larvātus*).

Semolina (sem-o-lē'na), a term applied to a kind of wheat-meal in large hard grains, used for making puddings, thickening soup, etc. In grinding, the millstones are so adjusted as to leave the product in a granular form and not reduced to a state of flour. The hard wheats of Southern Europe are best adapted for this purpose.

Sempach (zem'pȧh), a village of Switzerland, in the canton and 8 miles northwest of Lucerne, on the Lake of Sempach (3½ miles long). It is remarkable as being the scene of a great victory which the Swiss gained over the Austrians under Duke Leopold, who was slain, together with 600 nobles and upwards of 2000 troops.

Sempervi'vum. See *Houseleek.*

Senaar. See *Sennaar.*

Senate (sen'at), originally the supreme legislative body of ancient Rome, composed of citizens appointed or elected from among the patricians, and later from among wealthy plebeians or others who had held certain high offices of state. Originally the senate had supreme authority in religious matters, much legislative and judicial power, the management of foreign affairs, etc. At the close of the republic and under the empire the authority of the senate was little more than nominal. In modern times the name 'senate' is applied to the upper or less numerous branch of a legislature, as in France, Italy, the United States, Canada, and in the separate states of the Union. The senate of the United States consists of ninety-six members, two from each state. Senators are elected for six years, but the terms of office are so arranged that one-third of the members retire every two years. (See *Senators, Popular Election of.*) A senator must be at least thirty years of age, nine years a citizen of the country, and a resident of the state from which he is chosen. In addition to its legislative functions the senate has power to confirm or reject nominations and treaties made by the President, and also to try impeachments.

Senators, Popular Election of. The Seventeenth Amendment to the Constitution of the United States which was ratified by the necessary number of states on April 8, 1913, transferred the power of electing senators from the state legislature to the people at the polls. For more than sixty years proposals were made to change the Constitution in this manner; but it was not until June 24, 1911, that the senate was induced to give its consent to the change. The original theory in establishing the choice of senators was that they represented the states, whereas the members of the house directly represented the people. See *United States—Amendments to the Constitution.*

Seneca (sen'e-ka), a lake in the western part of New York State, 25 miles S. of Lake Ontario, into which its waters flow. It is about 37 miles long, from 2 to 4 miles broad, and 630 feet deep. It communicates with the Erie Canal, and steamers ply upon it.

Seneca, Lucius Annæus, called Seneca the philosopher, son of the following, was born at Corduba (Cordova) A.D. 3. When quite young he went to Rome, where he made rapid advances in knowledge under the tuition of his father, and also studiously pursued the Stoic philosophy. One of his best treatises *Consolatio ad Helviam* (a letter of consolation addressed to his mother), and also *Consolatio ad Polybium* (a letter consoling Polybius on the loss of his brother), were written in Corsica, whither he was banished in A.D. 41, being accused, through the jealousy of Messalina, of undue intimacy with Julia, a niece of the Emperor Claudius. He was recalled in 49, made prætor, and appointed joint-tutor with Burrhus of the young Domitius, afterwards the Emperor Nero. The good government of the first years of Nero's reign was largely due to Seneca (though Seneca had consented to the assassination of Nero's mother), but he lost his influence, and being accused of complicity in the conspiracy of Piso he was forced to commit suicide (A.D. 66). His works comprise treatises *On Anger; On Providence; On Tranquillity of Mind; On the Steadfasiness of the Wise Man; On Clemency,* addressed to Nero; seven books *On Benefits;* seven on investigations of nature; and twenty books of moral letters. The tragedies which bear Seneca's name are very inferior to his prose writings, and it is doubtful whether he is really the author, some of them having been attributed to his father.

Seneca, Marcus Annæus, rhetorician, and the father of the preceding, was a native of Corduba, in Spain, and was born about 61 B.C. He went to Rome during the reign of Augustus, and there taught rhetoric with great success for several years. He died at Rome towards the close of the reign of Tiberius (A.D. 37). He was the author of a collection of extracts showing the treatment of school themes by contemporary rhetoricians, but of no importance as literature.

Seneca Falls, a town of Seneca Co., New York, on Seneca River, which flows from Seneca Lake to Cayuga Lake, 16 miles E. by N. of Geneva. It is a shipping point for a farming district. The beautiful falls on the river afford excellent water-power and there are manufactures of steam fire-

engines, hook-and-ladder trucks, woolen goods, pumps, etc. Pop. (1920) 6389.

Seneca Indians, a tribe originally inhabiting the western part of New York State, and belonging to the Six Nations. They number upwards of 2600 on New York reservations, and there is a small band in the Indian Territory.

Senecio. See *Groundsel.*

Senefelder (sā'ne-fel-dėr), ALOYS, the inventor of lithography, born at Prague 1771; died at Munich 1834. See *Lithography.*

Senega (sen'e-ga), or SEN'EKA (*Polygăla Senĕga*), a plant belonging to the nat. order Polygalaceæ, common in the United States. It has a woody, branched, contorted root, about ½ inch in diameter, and covered with ash-colored bark. This has been celebrated as a cure for the bite of the rattlesnake. Medically it is considered stimulating, expectorant, and diuretic, and is now almost exclusively used in cough mixtures, being similar in its effects to squill.

Senega (*Polygăla Senĕga*).

Senegal (sen-ē-gal'), a river of Western Africa, which rises in the interior not far from some of the Niger sources, and after a course of some 1000 miles falls into the Atlantic near lat. 16° N. It is navigable for about 700 miles from its mouth, as far as the cataracts of Félou, beyond which its capabilities have not been ascertained. Its volume approaching the coast is greatly reduced by numerous *marigots* or channels which divert its waters through the adjacent plains, and as its mouth is dangerously barred, at most seasons the entrance of any but small craft is prevented.

Senegal, a French colonial dependency in West Africa, in Senegambia, comprising the island and town of St. Louis, at the mouth of the Senegal, several forts along the banks of that river, the island of Goree, Albuda on the Gambia, and other stations south of Cape Verd. Area (including dependencies), 51,000 square miles. The chief exports are ground-nuts, palm-oil, kola-nuts, gum, hides, wax, ivory, cabinet-woods, and gold-dust. Imports — manufactured goods, wines, spirits and provisions. The French first settled here in 1637. It was taken by the English in 1756, retaken by the French in 1779, and subsequently held by the English till the Peace of 1814. Pop. est. 1,800,000.

Senegambia (sen-ē-gam'bi-a), a name formerly applied to an extensive region of Western Africa, comprising the countries between lat. 8° and 17° N.; lon. 4° and 17° 30' W.; bounded N. by the Sahara, E. by Soudan, S. by Guinea, and W. by the Atlantic. The western or maritime portion of the country is a low, flat, swampy plain, from 150 to 200 miles wide. East of the country is mountainous with valleys running north and south. The chief rivers are the Senegal, the Gambia, the Rio Grande, and the Nuñez. Vegetation is luxuriant along the lower Senegal. Farther south the mangrove and palm, together with the gigantic baobab, the African teak, and other large trees are seen. Rice, maize, and other grains, with bananas, manioc, and yams are grown, while the orange, citron, and other fruits introduced by the Portuguese are now extensively cultivated on the hills. Wild animals comprise the elephant, hippopotamus, monkeys, antelopes, gazelles, lion, panther, leopard, hyenas, jackal, crocodile, etc. The climate is intensely hot, and very unhealthy for Europeans. The major portion of this territory is now part of the newly constituted Senegambia and Niger Territories, a dependency of France founded by decrees of 1902 and 1904. The remainder of it is included in Senegal.

Seneschal (sen'e-shal), formerly a steward or major-domo who superintended the affairs of the household of some prince or grandee, having charge of feasts and ceremonials.

Senior (sē'nyur), NASSAU WILLIAM, an English political economist, born in 1790. He was graduated as M.A. from Oxford in 1814, and in 1819 was called to the bar at Lincoln's Inn. In 1825 he was appointed to fill the newly constituted chair of political economy at Oxford. This he resigned in 1830, but was reappointed in 1847. Of his writings mention may be made of

An Outline of the Science of Political Economy (London, 1836); *Political Economy* (London, 1850); *Essays on Fiction* (London, 1864); a collection of articles on Scott, Thackeray, and others; and *Historical and Philosophical Essays* (two vols., London, 1865), many of the above being articles reprinted from the reviews. He died in 1864.

Senlis (saṇ-lēs), a very old town in France, department of Oise, 30 miles S. E. of Beauvais. It has old walls, flanked by watch-towers; ruins of an ancient castle, the residence of French kings from Clovis to Henri IV; and a small but handsome cathedral (end of twelfth century). Pop. (1906) 6074.

Senna (sen'a), a substance used in medicine, consisting of the leaflets of several species of *Cassia*, but the exact botanical source of some of the commercial kinds is still uncertain. Alexandrian senna is derived from *Cassia lanccolāta* and *C. oborāta*. It is grown in Nubia and Upper Egypt, and imported in large bales from Alexandria. It is frequently adulterated with the leaves of other plants.

Senna (*Cassia lanceolata*).

Sennaar, or SENAAR (sen-är'), a region of Africa, in the Soudan, area about 115,000 sq. miles, between the Bahr-el-Azrek, or Blue Nile, and the Bahr-el-Abiad, or White Nile, E. of Kordofan and bordering on Abyssinia. The country is mostly flat and sterile, but well cultivated on the river banks, where are numerous towns or villages. The population, estimated at 1,500,000, is greatly mixed. Originally an independent Negro kingdom, it was afterwards subject to Egypt, but Khartoum, the Egyptian headquarters, and the whole country were abandoned consequent upon the Soudanese rebellion. It was reconquered by the British for Egypt in 1898. The town of Sennaar, on the Blue Nile, once large and well-built, is now largely in ruins, with a population of a few thousands.

Sennacherib (sen-nak'e-rib), an Assyrian king, son of Sargon, whom he succeeded B.C. 705. He suppressed the revolt of Babylonia, and marched against the Aramæan tribes on the Tigris and Euphrates, of whom he took 200,000 captive. He then reduced part of Media; rendered tributary Tyre, Aradus, and other Phœnician cities; advanced upon Philistia and Egypt, and finally proceeded against Hezekiah, king of Judah, who had revolted. Yielding to panic, Hezekiah paid the tribute exacted of 300 talents of silver and 30 talents of gold. On his return to Assyria Sennacherib again attacked Babylonia and afterwards reinvaded Judah. Having marched through Palestine he besieged Libnah and Lachish, and wrote a threatening letter to Hezekiah; but in consequence of a miraculous visitation which caused the death of 185,000 of his troops, Sennacherib returned to Nineveh and troubled Judah no more. From Herodotus we learn an Egyptian tradition regarding the destruction of Sennacherib's host, but no mention of it is found in the monuments of Sennacherib. The greatest architectural work of Sennacherib was the palace of Koyunjik, which covered fully eight acres. Of the death of Sennacherib nothing is known beyond the brief Scripture statement of 2 Kings xix, 37, and Isa. xxxvii, 38, from which it appears that he was murdered 681 B.C.

Senones (sen'o-nēz), an ancient tribe of Gauls, who were settled on the river Yonne. The chief town of this tribe was the Sens of to-day.

Sens (säṇs), a town of France, department of Yonne, on the right bank of the Yonne, 31 miles N. N. W. of Auxerre. It is surrounded with old walls, partly Roman, and entered by several ancient gates; is well built, and has a fine early Gothic cathedral and various manufactories. Pop. 14,962.

Sensation (sen-sā'shun), the name applied to indicate the consciousness of an impression produced on sensory nerve fibers. (See *Nerve.*) An impression might be produced upon a sensory nerve and transmitted to a nerve-center, leading to stimulation of the center and to some subsequent change, but if no consciousness of such existed it could not be called a sensation. Thus, an impression made on an organ of sense might reach a lower nerve center, and by reflex action induce a muscular movement, while the centers devoted to consciousness being asleep or preoccupied remained unaffected. To this kind of impression the term sensation is not applicable. The external organs by means of which particular kinds of impressions are primarily received, and thence transmitted to the brain, are called the organs of the senses; these are the eye, the ear, the nose, and the tongue, besides the nerves dispersed under

the common integument, which give rise to the common sensation feeling or touch. This last is of a more general kind than the others, making us aware of heat and cold, rough and smooth, hard and soft, etc. In addition to these, according to Professor Bain, 'the feelings connected with the movements of the body, or the action of the muscles, have come to be recognized as a distinct class, differing materially from the sensations of the five senses. They have been regarded by some metaphysicians as proceeding from a sense apart, a sixth or muscular sense.' Of the sensations which are most readily perceived by animals, that of *resistance* or *touch* is perhaps the most widely diffused. By the resisting feel of matter we judge of its shape and of its other attributes. Next to resistance sensibility to *heat* is the best defined and most frequently displayed sensation. The sense or consciousness of *light* or luminosity succeeds that of temperature; *taste* comes next in order; then *hearing;* while *smell* is probably one of the least diffused of sensations. The special senses and the structure of the organs of sense are described under the headings *Eye*, *Ear*, *Nose*, *Smell*, *Touch*, etc. (which see).

Sensationalism (sen-sā'shun-al-izm), in philosophy, is the theory or doctrine that all our ideas are derived through our senses or solely by means of sensation.

Senses. See special articles *Eye*, *Ear*, *Nose*, *Smell*, *Touch*, etc.; also *Nerve*, *Sensation*, etc.

Sensitive Flames (sen'si-tiv), gas flames which are easily affected by sounds, being by them made to lengthen out or contract, or change their form in various ways. The most sensitive flame is produced in burning gas issuing under considerable pressure from a small taper jet. Such a flame will be affected by very small noises, as the ticking of a watch held near it, or the chinking of small coins 100 feet off. The gas must be turned on so that the flame is just at the point of roaring.

Sensitive Plant (*Mimōsa pudīca;* nat. order Leguminosæ), a plant celebrated for its apparent sensibility. It is a native of tropical America, but is often grown in greenhouses. The leaves are compound, consisting of four leaves, themselves pinnated, uniting upon a common footstalk. At the approach of night the leaflets all fold together; and the common footstalk bends towards the stem; at sunrise the leaves gradually unfold, and recover their usual state. So far, this is evidently the effect of light, but the same phenomena take place on touching the plant roughly, only that it recovers itself in a short period. The same property belongs to other species of Mimosa, and to species of other genera, as the *Dionæa muscipula* (which see), etc.

Sensorium (sen-sōr'i-um), the supposed center of sensation and consciousness, or the seat of the soul. Once believed to be some spot in the brain, now usually attributed to the brain as a whole.

Sentence (sen'tens), in grammar, a combination of words which is complete in itself as expressing a thought or proposition, and in writing is marked at the close by a full point. It is the unit or ground-form of speech. According to the grammars a sentence must always contain two members — the *subject* or thing spoken of, and the *predicate* or that which is enunciated regarding the subject. Accordingly every sentence must have a finite verb, though in impassioned language the verb is frequently understood. Sentences are distinguished into *simple*, *complex*, and *compound.* A simple sentence has only one subject and one finite verb, as 'The man is brave.' This may be more or less expanded by the use of adjuncts, and still retain its character of a simple sentence. A complex sentence is a principal sentence with one or more subordinate sentences, as 'The man, *who is truly patriotic*, will risk his life for his country.' A compound sentence consists of two or more simple sentences connected by conjunctions, as 'The sun rises in the east and sets in the west.' It differs from the complex sentence in having its clauses coördinate, and not, as in the other, in subordination to a principal clause.

Sentinel Crab (sen'ti-nel), (*Podophthalmus vigil*), a species of crab so named from its active watchful habits, and from the very elongated footstalks upon which the eyes are set. It inhabits the shores and islands of the Indian Ocean.

Sentry (sen'tri), or SENTINEL, a soldier set to watch or guard an army, camp, or other place from surprise, by observing and giving notice of the approach of danger. At night each sentinel is furnished with the countersign (a certain word or phrase), and no one may approach or pass him without giving this preconcerted signal.

Seoul. See *Söul.*

Sepal (sep'al, sē'pal), in botany, one of the separate divisions of a calyx when that organ is made up of various leaves. When it consists of but one part the calyx is said to be *monosepalous;* when of two or more parts, it is said to be *di-*, *tri-*, *tetra-*, *pentasepalous*, etc. When of a variable and indefinite number of parts, it is said to be *polysepalous*.

s s, Sepals.

Separation (sep-à-rā'shun), the legal term to denote the living apart of man and wife without a divorce. It may be voluntary or under a decree.

Sepia (sē'pi-a), a genus of Cephalopoda or cuttle-fishes, included in the family Sepiadæ. These cephalopods, of which the *Sepia officinalis*, or common sepia, is a typical example, belonging to the dibranchiate or 'two-gilled' section of their class, and to the group of decapoda or 'ten-armed' forms. The family Sepiadæ possesses an internal calcareous shell, the so-called *sepiostaire* or 'cuttle-fish bone,' which is often cast up upon some coasts, and was formerly in repute as an antacid in medicine, and as the source of the 'pounce' once used for spreading over eroded ink-marks to form a smooth surface for the corrected writing. There are four rows of pedunculated suckers on the arms of the genus *Sepia*. Lateral fins exist. The two tentacles or arms, which are longer than the remaining eight, possess suckers at their expanded extremities only. The eggs of the sepia resemble bunches of grapes in form, and hence are sometimes called 'sea-grapes.' The eggs are each protected in a leathery capsule. The common sepia occurs especially in the Mediterranean Sea, but also on the Atlantic coast. It is chiefly sought after on account of the inky matter which it affords. This secretion, which is insoluble in water, but extremely diffusible through it, is agitated in water to wash it, and then allowed slowly to subside, after which the water is poured off, and the black sediment is formed into cakes or sticks. When prepared with caustic lye it forms a beautiful brown color, with a fine grain, and has given name to a species of monochrome drawing now extensively cultivated.

Sepoy (sē'poi; a corrupted form of *sipahis*, soldiers, from *sip*, bow or arrow, the original weapon of the Hindu soldier), the name given to the native forces in India. They form an important part of the Anglo-Indian army. Though not generally equal in courage and dexterity to European soldiers, the Sepoys are hardy and capable of enduring much, and very temperate in their food.

Septaria (sep-tā'ri-a), nodules or rounded lumps found in rocks. They are usually composed of clay ironstone, or limestone mixed with clay; and are distinguished by the cracks (almost always filled up with some mineral) which cross each nodule. Great numbers are found in the London clay of the Isle of Sheppey, and in the shales of coal-fields.

September (sep-tem'bėr; from the Latin *septem*, seven), the ninth month of our year, but the seventh of the old Roman year, which began in March. It contains thirty days.

Septicæmia (sep-ti-sē'mi-a), SEPTÆMIA (Gr. *sēptikos*, *sēptos*, putrefying; from *sēpō*, to putrefy, and *haima*, blood), blood-poisoning by absorption into the circulation of poisonous or putrid matter through any surface. Pyæmia is a subvariety.

Septuagesima Sunday (sep-tū-a-jes'i-ma), the third Sunday before Lent, so called from its being about seventy days before Easter (L. *septuagesimus*, seventieth).

Septuagint (sep'tū-a-jint), or the LXX, the Version of the Seventy, the Alexandrine Version, etc., is the oldest Greek version of the Old Testament. It is so called either because it was approved and sanctioned by the sanhedrim, or supreme council of the Jewish nation, which consisted of about seventy members, or because, according to tradition, about seventy men were employed on the translation. The language is the Hellenistic Greek of Alexandria, based upon the Attic dialect. The translation is reported by Josephus to have been made in the reign and by the order of Ptolemy Philadelphus, king of Egypt, about 270 or 280 years before the birth of Christ. It is believed, however, by modern critics that the Septuagint version of the several books is the work, not only of different hands, but of separate times. It is probable that at first only the Pentateuch was translated, and the remaining books gradually. The Septuagint was in use up to the time of our Saviour, and is that out of which most of the citations in the New Testament from the Old are taken. It is an invaluable help to the right understanding of the Hebrew Scriptures. The principal extant MSS. known are the *Codex Alexandrinus* in the British Museum, the *Codex Vaticanus* in Rome,

and the *Codex Sinaïticus*, (imperfect) in St. Petersburg. The principal printed editions are the *Aldine* (Venice, 1518), the *Complutensian* (1522), the *Roman* or *Sixtine* (1587), and the *Grabian* (Oxford, 1707).

Sepulchral Mound. See *Tumuli, Barrow.*

Sepulveda (sā-pöl'vā-dȧ), JUAN GINES DE, a Spanish theologian and historian, born about 1490 at Pozo Blanco, near Cordova. He assisted Cardinal Cajetan at Naples in revising the Greek text of the New Testament, and in 1536 Charles V appointed him his historiographer, and tutor to his son Philip. In 1557 he quitted the Spanish court, and retired to Mariano, where he died in 1573. Among his writings are a *History of Charles V*, *History of Philip II*, *History of the Conquest of Mexico*, etc.

Sequence (sē'kwens), in music, the recurrence of a harmonic progression or melodic figure at a different pitch or in a different key to that in which it was first given. In the Roman Catholic Church the term sequence is applied to a hymn introduced into the mass on certain festival days.

Sequestration (sē-kwes-trā'shun), in law, the act of separating a thing in controversy from the possession of both parties, till the right is determined by course of law. It is either voluntary or necessary; voluntary when it is done by consent of the parties, and necessary when it takes place by order of the official authority. *See Bankrupt.*

Sequin (sē'kwin), a Venetian gold coin first struck about the end of the thirteenth century, and equivalent in value to about $2.30. Coins of the same name, but differing in value, were issued by other states.

Sequoia (se-kwoi'a; from the American Indian *Sequoyah*, who invented the Cherokee alphabet), a genus of conifers, consisting of two species only — *S. sempervirens*, the redwood of the timber trade, and *S. gigantea*, the big or mammoth tree of the western United States. They are both natives of America, the latter having been discovered in the Sierra Nevada in 1852. One specimen in Calaveras Co., California, has a height of 325 feet, and a girth 6 feet from the ground of 45 feet. The Mariposa Grove, 16 miles south of the Yosemite Valley, contains upwards of 100 trees over 40 feet in circumference, and one over 93 feet at the ground, and 64 feet at 11 feet higher. This grove has been set aside as a National Park. The age of these trees is estimated at from 2000 to 3000 years. The *S. gigantea* has been successfully introduced into England, where some of them have already attained a good height. It is there known as *Wellingtonia*. The redwood is also very large and grows abundantly on the Coast Range of California. Its timber is easily worked and is much used.

Seraglio (se-ral'yō), properly SERAI, the palace of the Turkish sultan at Constantinople. It stands in a beautiful situation, on a point of land projecting into the sea. (See *Constantinople.*) Its walls embrace a circuit of about 9 miles, including several mosques, spacious gardens, the harem, and buildings capable of accommodating 20,000 men, though the number of the sultan's household does not amount to above 10,000. The principal gate of the seraglio is called *Babi Humayum* (Sublime Porte).

Seraing (sė-raṇ), a town of Belgium, in the province of Liége, 3 miles southwest of Liége, on the Meuse. Cockerill's extensive iron, steel, and machine works (including also coal-pits), employing 12,000 hands, are established here, and other industries are carried on. Pop. (1910) 42,893.

Serajevo. See *Bosna-Serai.*

Serampore, or SERAMPUR (ser-um-pör'), a town of Hindustan, in the province of Bengal, on the right bank of the Hugli, 12 miles above Calcutta. It is built in the European style, and formerly belonged to the Danes, who sold it to the British government in 1845. Serampore was the headquarters of the celebrated Baptist missionaries Carey, Marshman, and Ward; and there are a church, school, college, and library connected with the mission. Pop. 44,451.

Serapeum (se-ra-pē'um), the name given to temples dedicated to the god Serapis, the two most celebrated of which are those of Alexandria and Memphis. See *Serapis.*

Seraph (ser'af), plural SERAPHIM, a name applied by the prophet Isaiah to certain attendants of Jehovah in a divine vision presented to him in the temple (Isa. vi, 2). These seraphim have commonly been understood to be angels of the highest order — *angels of fire.* The term seraphim is used elsewhere only of the serpents of the wilderness (Num. xxi, 6, 8, and Deut. viii, 15). See *Cherub.*

Serapis (se-rā'pis), or SARAPIS, an Egyptian deity whose worship

was introduced into Egypt in the reign of Ptolemy I. Plutarch and Tacitus relate that Ptolemy having seen in a dream the image of a god, which he was ordered to remove from the place in which it stood, sent to Sinope, and brought thence a colossal statue, which he set up in Alexandria. It was declared to represent the god Serapis, and appears to have been originally a statue of Pluto or Jupiter. The name Serapis is composed of the names Osiris and Apis. A magnificent temple was built at Alexandria for the reception of the statue of Serapis, and this temple — the Serapeum — was the last hold of the pagans in that city after the introduction of Christianity. The ruins of another temple to Serapis at Memphis were discovered in recent times. The Egyptians themselves never ackowledged him in their pantheon, but he was the principal deity in the Greek and Roman towns of Egypt. Forty-two temples are said to have been erected to him in Egypt under the Ptolemies and Romans; his worship extended also to Asia Minor, and in 146 A.D. it was introduced to Rome by Antoninus Pius. The image of Serapis perished with his temple at Alexandria, it being destroyed in 389 by the order of Theodosius.

Seraskier (se-ras′kēr), a name given to the commanders-in-chief of Turkish armies, and to the generalissimo or minister of war.

Serbs, the Servians. See *Servia.*

Serenade (ser-e-nād′), music performed in the open air at night; often, an entertainment of music given in the night by a lover to his mistress under her window; or music performed as a mark of esteem and goodwill towards distinguished persons. The name is also given to a piece of music characterized by the soft repose which is supposed to be in harmony with the stillness of night. The Italian name *Serenata* is now applied to a cantata having a pastoral subject, and to a work of large proportions, in the form to some extent of a symphony.

Seres (ser′es), a walled town in Turkey, 35 miles N. E. of Salonica. It is well built, and has various mosques and Greek churches, spacious bazaars, manufactures of linen and cotton goods, and a considerable trade in cotton, tobacco, corn, and fruit. Seres is the headquarters for the Turkish wool trade. Pop. (1905) 30,000.

Sereth (se-ret′), an important affluent of the Danube. It rises in the Carpathians in Bukowina, flows through Roumania, and joins the Danube 5 miles above Galatz after a course of 300 miles.

Sereth, a town of Austria, in Bukowina, on the river of same name. Pop. 7614.

Serf, a term applied to a class of laborers existing under the feudal system, and whose condition, though not exactly that of slaves, was little removed from it, the serf being bound to the estate on which he lived. Under this system, from the vassals of the king downwards, the whole community was subject to certain degrees of servitude, and it was only on condition of specific services to be rendered to his superior that any individual held his fief. In the case of the lower classes this servitude amounted to an almost complete surrender of their personal liberty. There were two classes of laborers, the villeins and the serfs proper. The former occupied a middle position between the serfs and the freemen. Hallam remarks, in reference to these two classes, that in England, at least from the reign of Henry II, one only, and that the inferior, existed; incapable of property and destitute of redress except against the most outrageous injuries. A serf could not be sold, but could be transferred along with the property to which he was attached. The revival of the custom of manumission counteracted the rapid increase of serfs. A serf could also obtain his freedom by purchase, or by residing for a year and a day in a borough, or by military service. By these various means the serf population gradually decreased. In most parts of the Continent they had disappeared by the fifteenth century. The extinction of serfdom in England and Scotland was very gradual. As late at 1574 Elizabeth issued a commission of inquiry into the lands and goods of her bondsmen and bondswomen in specified counties in order to compound for their manumission; and even in the eighteenth century a species of serfdom existed among Scottish miners. Serfdom in Russia was abolished by a manifesto of Alexander II on March 17, 1861.

Serge (sėrj), a kind of twilled worsted cloth used for ladies' dresses, gentlemen's summer suits, etc. Navy serge is a thick durable make of this stuff, used chiefly by seafaring folk.

Sergeant (sär′jent), a non-commissioned officer in the army, ranking next above the corporal. He is appointed to see discipline observed, to teach the soldiers their drill, and also to command small bodies of men, as escorts and the like. A company has five sergeants, of whom the senior is called first

or orderly sergeant; above them is the sergeant-major, who acts as assistant to the adjutant.

Sergeant-at-arms. See *Serjeant-at-arms.*

Sergeanty (sår'jen-ti), GRAND, a tenure in feudal times whereby the tenant held land of the crown by performing some service to the sovereign in his own person. Petty-sergeanty was a tenure of land from the king by the service of rendering to him annually some small article, as a bow, sword, spurs, or the like.

Sergipe (ser-zhē'pe), or SERGIPE-DEL-REY, a maritime province of Brazil, N. of Bahia; area, 15,093 square miles. The coast is low and sandy, but the interior is mountainous. The chief river is the São-Francisco on the north. Cotton, sugar-cane, rice, tobacco, etc., are grown, and the woods furnish good timber, dyewoods and quinine. Pop. 356,264. The chief town is Aracajú; pop. 10,000.

Sericulture (ser'i-kul-shur), the cultivation of the silk-worm, for the purpose of obtaining silk from its cocoons. China and Japan are the leading seats of this industry, though it exists in various other localities. It has frequently been attempted in the United States, but the lack of cheap labor has always rendered it unsuccessful.

Seriema (ser-i-ē'ma; *Dicholŏphus cristātus*), a grallatorial bird of the size of a heron, inhabiting the open grassy plains of Brazil and other parts of South America. Its feathers are of a gray color, and a kind of crest rises from the root of the beak, consisting of two rows of fine feathers curving backwards. The eye is sulphur-yellow, the beak and feet red. It is of retired habits, and utters a loud screeching cry, which somewhat resembles that of a bird of prey or the yelping of a young dog. The seriema is protected in Brazil on account of its serpent killing habits and is often domesticated.

Series (sē'rēz), in mathematics, a set of terms or magnitudes connected by the signs + and —, and differing from one another according to a certain law. $1 + 2 + 3 + 4 + \ldots + n$ is a series whose sum is $\frac{n}{2}(n + 1)$. This series is a simple form of *arithmetical progression;* the most general form is $a + (a + b) + (a + 2b) + \ldots + (a + (n - 1)\,b)$, and the sum is $\frac{n}{2}(2a + (n - 1)\,b)$, where n is the number of terms, and b is called the common difference. A *geometrical series* or *progression* is of the form $a + ar + ar^2 + \ldots + ar^{n-1}$, and the sum of such a series is $\frac{a(r^n - 1)}{r - 1}$.

Serinagur. See *Srinagar.*

Seringapatam (ser-in-gâ-pâ-tam'; properly, *Sri-ranga-patanam*, 'city of Vishhu'), a celebrated town and fortress in the province of Mysore, Madras Presidency, India. It is situated on an island formed by two branches of the Kaveri, 245 miles S. W. of Madras, and is generally ill-built, with narrow, dirty streets. It was once the capital of Mysore. The palace, formerly extensive, is now in ruins. Other notable public buildings are the great mosque, and the pagoda of Sri Ranga, the arsenal, and the cannon foundry. The massive fortifications were the work of Tippoo, the son of Hyder Ali, assisted by French engineers, and the fortress was three times besieged by the British, first in 1791, and afterwards in 1792 and 1799. On the last occasion it was carried by assault, Tippoo himself being slain while fighting desperately, together with 8000 men. Pop. 8584, once 140,000.

Seriphos (se-rī'fos), or SERPHO, a small rocky island belonging to the Greek Cyclades, yielding some corn and wine, while iron ore is mined. It was used as a place of exile by the Romans. Pop. 3851.

Serjeant-at-arms (sår'jint), in the United States the sergeant-at-arms of the national House of Representatives or Senate, or of a State legislative body, is the officer charged with the preservation of order, and, frequently, with accounts, disbursements, and the serving of processes. In England he is one of the officers who attend the person of the sovereign to arrest offenders of distinction, etc. Two of them attend on the two houses of Parliament.

Serjeant-at-law, in England, a lawyer, formerly of the highest rank under a judge. The judges in common law formerly were always selected from the serjeants, but this monopoly has been abolished. A serjeant is appointed by a writ of the crown. A king's counsel, except in certain circumstances, takes precedence of a serjeant-at-law. *Serjeants' Inn* is a society or corporation consisting of the entire body of serjeants-at-law.

Serous Fluids (sē'rus), a name given to the lymph-like pellucid fluids secreted by certain membranes and contained in certain cav-

ities of the body. An excess of this secretion constitutes a diseased and often a dropsical condition. See next article.

Serous Membranes, are certain double membranes in the human body, as the pleura, pericardium, peritoneum, etc., which form a sort of closed sac surrounding certain organs, the interior surfaces of the sac secreting a small quantity of serous fluid. Their chief function is to allow free action to the organs, and they are also intimately connected with the absorbent system, the vessels of which freely open on their surfaces. These membranes are liable to various diseases, as inflammation (pleurisy, pericarditis, etc.), morbid growths, dropsical effusions, hæmorrhage, etc.

Serpent-charming, an art of great antiquity, confined in practice exclusively to eastern countries. Several allusions are made to it in the Bible as Ps. lviii, 5; Eccl. x, 11; Jer. viii, 17, and also in classical writers. The power exercised by the charmers over poisonous serpents is unquestionably remarkable, and though there is little doubt that the common practice of the charmers is to extract the fangs before exhibiting their feats, yet we have good authority for believing that it is not unusual to dispense with this. The instrument usually employed in serpent-charming is a kind of pipe, which is varied by whistling and the use of the voice. The effect of this medley of sounds is to entice the serpents from their holes, and this done the serpent-charmer pins them to the ground with a forked stick. In India and other places the art of serpent-charming is an hereditary profession, and is practiced for the purpose of gaining a livelihood by administering to the amusement of the public. Besides the evident power music has upon the serpents, they appear to be influenced in a marked degree by the eye of the charmer, who controls them by merely fixing his gaze upon them.

Serpent-eater. See *Secretary-bird.*

Serpentine (sėr'pen-tīn), an abundant mineral, usually having a granular or impalpable composition, and presenting red, brown, black, yellow and gray colors, in veined, spotted, and other figures or combinations; surface almost dull; luster resinous; streak white, acquires some luster; hardness 3; specific gravity 2.5. Serpentine is divided into the *common* and *precious* serpentine, the former of which consists of those varieties which are destitute of handsome colors, while the latter includes all such as are suited to purposes of ornament. Chemically it is a hydrous silicate of magnesia. Serpentine forms mountain masses, and beds in primitive rocks. Ornamental varieties of it are turned on the lathe into vases, and also worked into different ornaments.

Serpent (sėr'pent), or SNAKE (*Ophidia*), the name given an order of reptiles, characterized by an elongated and cylindrical body covered with horny scales, but never with bony plates. There is never any breast-bone nor pectoral arch, nor fore-limbs, nor as a rule any traces of hind-limbs. In a few cases, however (as in the python), rudimentary hind-limbs may be detected. The ribs are always numerous, some serpents having more than 300 pairs. These not only serve to give form to the body and aid in respiration, but are also organs of locomotion, the animal moving by means of them and of its scales, which take hold on the surface over which it passes. The vertebræ are formed so as to give great pliancy, most if not all serpents being able to elevate a large portion of their body from the ground. They have hooked, conical teeth, not lodged in distinct sockets, useless for mastication, but serving to hold their prey. In the typical non-poisonous or innocuous serpents, both jaws and the palate bear continuous rows of solid conical teeth. In the venomous serpents, as vipers, rattlesnakes, etc., there are no teeth in the upper jaw excepting the two poison fangs. These are long, firmly fixed in a movable bone, above which there is a gland for the elaboration of poison. Each tooth is perforated by a tube through which the poison is forced. The tongue, which is forked, and can be protruded and retracted at pleasure, is probably rather an organ of touch than of taste. The eye is unprotected by eyelids, but it is completely covered and protected by an anterior layer of transparent skin attached above and below to a ridge of scales which surrounds the eye. No external ear exists. The nostrils are situated on the snout. The heart has three chambers, two auricles and a ventricle. The digestive system comprises large salivary glands, a distensible gullet, stomach, and intestine, which terminates in a cloaca with a transverse external opening. A urinary bladder is absent. The lungs and other paired or symmetrical organs of the body generally exhibit an abortive or rudimentary condition of one of these structures. As regards reproduction they are either oviparous or ovoviviparous, the eggs being either hatched externally or within the animal's body. Many serpents,

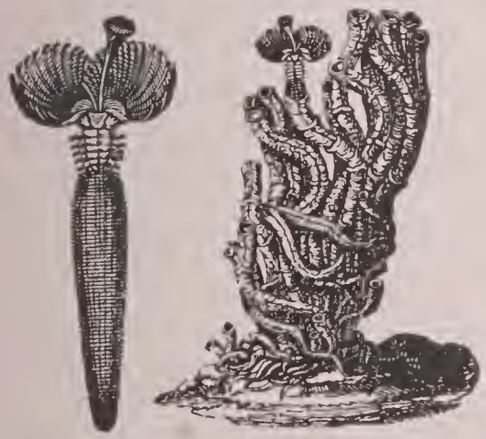
especially the larger species, as the boas, subsist on prey thicker than themselves, which they crush by constriction, and which they are able to swallow from the fact that throat and body are capable of great dilatation. The order is generally divided into two suborders, *Viperina* and *Colubrina*, the former having only two poison fangs in the upper jaw, the latter having solid teeth, besides grooved fangs. The different kinds or species of snakes will be found described in articles under their respective headings, such as *Rattlesnake*, *Python*, etc. See also *Reptiles*.

Serpent, a bass musical wind-instrument, of a serpentine form, made of wood covered with leather, having a mouthpiece and several keys; now almost superseded by the ophicleide.

Serpent Worship, ophiolatry; the worship of serpents as symbols or avatars of a deity, a branch of animal worship with a wide range in time and space. In modern times serpent worship is prevalent in India; also in Haiti, West Indies.

Serpukhov (ser'pu-*hov*), a town in Russia, in the government of Moscow, and 57 miles S. S. W. of the town of Moscow. It has an old cathedral, and manufactures of woolen, cotton, and linen cloth, paper, etc. Pop. 24,456.

Serpula (ser'pū-la), a genus of Annelida or worms, belonging to the order of Tubicola or tube-dwelling worms, inhabiting cylindrical and tortuous calcareous tubes attached to rocks, shells, etc., in the sea. The worm fixes



Serpula, detached and in tube.

itself within its tube by means of the bristles attached to its body-segment. Its head segments are provided with plume-like gills or branchiæ. No eyes exist in this creature, although it is extremely sensitive to the action of light.

Serra da Estrella, a lofty range of granite mountains near the middle of Portugal, highest summit 6460 feet. The range contains some remarkable lakes, part of which are tepid.

Serranus (ser-ra'nus), a genus of fishes of the perch family, some of them found on the British coasts.

Sertorius (ser-tō'ri-us), QUINTUS, a Roman general, born about 120 B.C. After serving with reputation under Marius against the Teutones in Spain he was made questor in Cisalpine Gaul in 91 B.C. In the quarrel between Sulla and Marius he sided with the latter. When Sulla returned from the Mithridatic war (83 B.C.) Sertorius was proscribed and fled to Spain. There he attempted to organize a force capable of resisting the army sent by Sulla to conquer Spain, but finding his means unequal to the contest he crossed over to Africa. He now assisted the Mauritanians fighting against their king. Having gained several victories and liberated the Mauritanians, the Lusitanians requested him to return to Spain and take command of their troops against the Romans. Opposed to much superior forces he displayed the talents of a skilful general, and successfully resisted the Roman leaders Metellus and Pompey. He was treacherously assassinated at a feast by his friend Perperna, B.C. 72. Sertorius has been made the subject of a tragedy by Corneille.

Sertularia (ser-tū-lar'i-a), the scientific name of a genus of Hydrozoa or zoöphytes to which, from their resemblance to miniature trees, the familiar name of 'sea-firs' is given.

Serum (sē'rum), the thin transparent part of the blood. The serum of the blood, which separates from the crassamentum during the coagulation of that liquid, has a pale straw-color or greenish-yellow color, is transparent when carefully collected, has a slightly saline taste, and is somewhat unctuous to the touch. It usually constitutes about three-fourths of the blood, the pressed coagulum forming about one-fourth. The term is also applied to the thin part of milk separated from the curd and oil. See *Blood*.

Serum Therapy. This is a modern method of treatment of some of the infectious diseases, and (in some cases) it is also used as a means of prevention. It is, really, a process of passive immunization, caused by injecting into a person the blood serum of an animal which has been actively immunized by inoculation with the toxins of bacteria or with the bacteria themselves. There are two kinds of protective serums used in the treatment of disease. The one kind is an *antitoxic* serum which neu-

tralizes bacterial toxins, and the other is an *antibacterial* serum which prevents the multiplication of the bacteria in the tissues. The chief antitoxic serums are the diphtheria antitoxin and the tetanus antitoxin; the chief antibacterial serums are the antistreptococcic, anticholera, antityphoid, and antiplague. The serums are supplied, as a rule, in liquid form, and administered by subcutaneous or intravenous or intraspinal injection, which must be given with the strictest antiseptic precautions. The value of serum therapy has been most thoroughly established in the case of diphtheria. The antitoxin for tetanus is similar to that used for diphtheria, but on account of the rapid progress of the disease is of little value unless administered early. Considerable success has been attained in the treatment of cerebrospinal meningitis by the use of Flexner's serum. Serum therapy is applied as a prophylactic as well as a curative agent in cases where there has been exposure to infection. There exists much confusion in the terminology of the subject, owing to the loose usage of the terms vaccine and serum. A *vaccine* is a suspension of killed cultures of a microorganism, which is injected into a patient. The vaccine stimulates the body of the patient to make antibodies for itself; it is, therefore, a process of active immunization. Vaccines are said to be of two kinds: (1) *Autogenous*, when they are prepared from organisms derived from the patient; and (2) *Stock*, prepared from virulent cultures of the organism isolated from other persons suffering from the same infection. See also *Vaccination*.

Serval (ser'val), or BUSH-CAT (*Leopardus Serval*), a carnivorous animal nearly related to the leopard and its allies, a native of Africa. The average length is about 2 feet 8 inches, including the bushy tail, about 16 inches long.

Servetus (ser-vē'tus), MICHAEL (properly MIGUEL SERVEDE), a learned Spaniard, memorable as a victim of religious intolerance, was born in 1509 at Villa Nueva, in Arragon. He was the son of a notary, who sent him to Toulouse for the study of the civil law. Here he began to give his attention to theology, and having formed views of the trinity antagonistic to the orthodox doctrine he removed to Germany, where he printed a tract entitled *De Trinitatis Erroribus* (1531), followed a year later by his *Dialogorum de Trinitate Libri duo*. Finding that his opinions were obnoxious in Germany, he escaped to France under the name of Michael of Villa Nueva. After fulfilling an engagement with the Frellons, booksellers of Lyons, he went to Paris, where he was graduated as doctor of medicine. In 1553, he published his matured theological system under the title of *Christianismi Restitutio* ('Restoration of Christianity'). He was arrested for heresy and imprisoned, but contrived to escape, and purposed to proceed to Naples. He was, however, apprehended at Geneva on a charge of blasphemy and heresy, and his various writings were sifted in order to ensure his condemnation. The divines of all the Protestant Swiss cantons unanimously declared for his punishment, and Calvin was especially urgent and emphatic as to the necessity of putting him to death. As he refused to retract his opinions he was burned at the stake on October 27, 1553. Servetus is numbered among the anatomists who made the nearest approach to the doctrine of the circulation of the blood.

Servia, or SERBIA, now JUGO-SLAVIA, a kingdom of Eastern Europe, bounded W. by the Adriatic and Italy; N. by Austria and Hungary, E. by Roumania and Bulgaria; S. by Greece and Albania. Area of old Servia in 1914, 18,644 sq. miles; pop. 2,956,909; Greater Servia (Jugo-Slavia) in 1920, 101,246 sq. miles; pop. 14,311,653. The surface of Servia proper is elevated and is traversed by ramifications of the Carpathians in the northeast, of the Balkans in the southeast, and of the Dinaric Alps in the west. The summits seldom exceed 3000 feet, though the highest reaches over 7000. The whole surface belongs to the basin of the Danube, which receives the drainage partly directly, and partly by the frontier river Save, augmented by the Drin and the Timok, but chiefly by the Morava, which flows through the center of the kingdom. The climate is somewhat rigorous in the elevated districts, but mild in the valleys and plains. There are extensive forests. Among the agricultural products are maize, wheat, flax, hemp, and tobacco. Wine is made in the districts adjoining Hungary, and the cultivation of prunes is extensive, their product being largely converted into plum brandy. Stock-raising is little less important, cattle, sheep, swine and goats being raised in large numbers. Silk-worms are extensively reared. Lead, zinc, quicksilver, copper, iron, and coal are found, and gold and silver in small quantities, but the mineral product is not large. Manufactures include carpet-weaving, embroidery, jewelry, and filigree work. The principal exports are dried prunes, pigs, wool, wheat, wine, hides, cattle, and horses; imports, cotton, sugar, colonial goods, hardware, etc. The great majority of the inhabitants are Slavonians, and adhere to

the Greek Church. The Servian language, formerly often called the *Illyrian*, is a melodious Slavonic dialect closely allied to the Bulgarian and Slovenian, and forms with them the southern Slavonic group. Several collections of patriotic Servian songs have been published, and both Goethe and Grimm have acknowledged the excellence of Servian poetry. In prose literature, however, little has been produced besides theological and religious works. The present constitution of Servia dates from 1889. The government is an hereditary monarchy, and the people are represented by an elected legislative assembly called the *skupstchina*. Capital, Belgrade.

History.—Servia was anciently inhabited by Thracian tribes; subsequently it formed part of the Roman province of Mœsia. It was afterwards occupied in succession by Huns, Ostrogoths, Lombards, Avares, and other tribes. The Servians entered it in the seventh century, and were converted to Christianity in the next century. They acknowledged the supremacy of the Byzantine emperors, but later made themselves independent, and under Stephen Dushan (1336-56), the Kingdom of Servia included all Macedonia, Albania, Thessaly, Northern Greece, and Bulgaria. About 1374 a new dynasty ascended the throne in the person of Lazar I, who was captured by the Turks at the battle of Kossova (in Albania) in 1389, and put to death. Servia now became tributary to Turkey. About the middle of the fifteenth century it became a Turkish province, and so remained for nearly 200 years. By the Peace of Passarowitz in 1718 Austria received the greater part of Servia, with the capital, Belgrade. But by the Peace of Belgrade in 1739 this territory was transferred to Turkey. The barbarity of the Turks led to several insurrections. Early in the nineteenth century Czerny George placed himself at the head of the malcontents, and, aided by Russia, succeeded after eight years of fighting in securing the independence of his country by the Peace of Bucharest, May 28, 1812. The war was renewed in 1813, and the Turks prevailed. In 1815 all Servia rose in arms under Milosh, and after a successful war obtained complete self-government, Milosh being elected hereditary prince of the land. Milosh was compelled to abdicate in 1839, and was nominally succeeded by his son Milan, who died immediately, leaving the throne vacant to his brother Michael. In 1842 this prince was compelled to follow the example of his father and quit the country, Alexander Karageorgevitch, son of Czerny George, was elected in his room; but in December, 1858, he also was forced to abdicate. Milosh was then recalled, but survived his restoration little more than a year. His son Michael succeeded him (1860), but was assassinated by the partisans of Prince Alexander on July 10, 1868. The princely dignity was then conferred on Milan (Obrenovitch), grand-nephew of Milosh. After the fall of Plevna in the Russo-Turkish war of 1877-78 Servia took up arms against Turkey, and by the treaty of Berlin (July 13, 1878) it obtained an accession of territory and the full recognition of its independence. It was erected into a kingdom in 1882. In 1885 a short war took place between Servia and Bulgaria, resulting in favor of the latter. In 1889 Milan abdicated in favor of his son Prince Alexander, who was murdered in June, 1903, and succeeded by Peter Karageorgevitch. Servia was incensed at the annexation of Bosnia and Herzegovina by Austria, but kept the peace. She took an active part in the Balkan war in 1912-13 (q. v.), and gained considerable territory at the expense of Turkey and Bulgaria. The assassination of the Austrian archduke at Serajevo in 1914 led to the European war (q. v.), Austria insisting that the Serbs were responsible for the crime. Serbia was overrun by the Bulgarians and Austrians, and the country laid waste. Over 100,000 Serbs were killed in battle. By the peace of 1919 (see *Treaty*), a new Serb-Croat-Slovene state, Jugo Slavia (q. v.) was formed. In 1921 King Peter died and was succeeded by his son Alexander (born 1888).

Service-Tree (*Pyrus domestica*, or *Pyrus Sorbus;* nat. order Rosaceæ, suborder Pomeæ), a European tree from 50 to 60 feet high, of the same genus as the apple and pear. It has imparipinnate leaves, whitish beneath, flowers in clusters, cream-colored, and resembling those of the hawthorn; fruit a reddish-color berry (about the size of a small gooseberry). The wood is very hard, fine-grained, and susceptible of a brilliant polish. *P. Americana*, the mountain ash, is a small tree common in New England and the Middle States.

Servites (serv'īts), or SERVANTS OF THE HOLY VIRGIN, a religious order founded at Florence about 1233. It first obtained recognition and sanction from Pope Alexander IV (1254-61), and from Martin V (1417-31) it received the privileges of the mendicant orders, but never had much influence in the church.

Servius Tullius (ser'vi-us tul'i-us), the sixth king of Rome. According to the tradition he was

the son of a slave, given by the elder Tarquin to Tanaquil, his wife. He married Tarquin's daughter, and on the death of his father-in-law (578 B.C., according to the usual chronology) he was raised to the throne. He defeated the Veientines and the Etruscans, and divided the population of Rome into tribes, instituting at the same time the *comitia centuriata* and *tributa;* he also beautified the city, and built several temples. According to the common story Servius married his two daughters to the grandsons of his father-in-law; the elder to Tarquin, and the younger to Aruns. The wife of Aruns murdered her own husband to unite herself to Tarquin, who had assassinated his wife. Servius was murdered by Tarquin, and his own daughter Tullia ordered her chariot to be driven over the mangled body of her father (534 B.C.).

Sesamum, or SESAME (ses'a-mum, ses'a-mē; *Sesamum*), a genus of annual herbaceous plants, nat. order Pedaliaceæ. The species, though now cultivated in many countries, are natives of India. They have alternate leaves and axillary yellow or pinkish solitary flowers. *Sesamum orientāle* and *S. indicum* are cultivated, especially in India, Egypt and Syria; they have also been introduced in America. Sesamum seeds are sometimes added to broths, frequently to cakes by the Jews, and likewise in the East. The oil expressed from them is bland and of a fine quality, and will keep many years without becoming rancid. It is often used as a salad-oil, and is also known as *gingelly-oil* and *benné-oil.* The leaves of the plant are mucilaginous, and are employed for poultices. Of the seeds two varieties are known in commerce, the one white and the other black.

Sesostris (se-sos'tris), a name given by the Greeks to an Egyptian king, who is not mentioned by that name on the monuments, and who is often identified with Ramses II. See *Rameses.*

Sessa (ses'sȧ), a town in South Italy, province of Terra di Lavoro, 17 miles east of Gaeta. It is a bishop's see, and has a handsome cathedral. It was a flourishing Roman colony under the name of Suessa-Aurunca. Numerous Roman remains (of aqueducts, baths, theater, etc.) still exist. Pop. 5367.

Sessile (ses'il; Latin *sessilis,* from *sedeo, sessum,* to sit), in zoology and botany, a term applied to an organ attached or sitting directly on the body to which it belongs without a support; as, a *sessile leaf,* one issuing directly from the main stem or branch without a petiole or footstalk; a *sessile flower,* one

Sessile Leaves.

Sessile Flower.

having no peduncle; a *sessile gland,* one not elevated on a stalk.

Session (sesh'un), COURT OF, also called the COLLEGE OF JUSTICE, the highest civil judicatory in Scotland, established by James V in 1532. It consists of thirteen judges: the lord-president, the lord justice-clerk, and eleven ordinary lords. The court is divided into an inner and an outer house. In the former sit the lord-president and three ordinary lords forming the first division, and the lord justice-clerk and other three ordinary lords forming the second division. The remaining ordinary lords sit in the outer court and hear cases singly. The judgments of inferior courts, except those of the small debt courts, are mostly subject to the review of the Court of Session. Judgments of the Court of Session may be appealed against to the House of Lords. The judges are appointed by the crown *ad vitam aut culpam.* See *Justiciary Court.*

Sessions. See *Quarter Sessions.*

Sestertius (ses-ter'shi-us), an ancient Roman silver coin worth 2½ asses. The sestertius was the fourth part of a denarius, and was worth about 4 cents.

Sestetto (ses-tet'to), a musical piece for six independent instruments or voices.

Sestos. See *Abydos.*

Setaria. See *Millet.*

Sethites (seth'īts), a Gnostic sect that existed in Egypt in the second century and bore some resemblance to that of the Ophites. They worshiped Seth, the son of Adam, as the son of God, but not of the creator of Adam and Eve, and maintained that he had reappeared in the person of Jesus Christ. They pretended to have several books written by him.

Seti I (sā'tē), the second king of the 19th Egyptian dynasty. He reigned about 1313-1292 B. C., and was something of a warrior. The walls of the great temple at Karnak record his exploits. He began the building of the Memnonium at Abydos, and the hall of columns at Karnak (see *Thebes*), completed by his son, Rameses II. His tomb was discovered in 1817 by Belzoni (q. v.), but his mummy was not found until 1881. His immediate predecessors were his father, Rameses I (1315-14 B.C.), Horemheb (1350-15 B. C.), Ay, Tut-ankh-amen, and Amenophis IV (1375-1350 B. C.).— SETI II was the fourth and last king of the 19th dynasty.

Seton, ERNEST THOMPSON, author and artist, born at South Shields, England, August 14, 1860; lived in the backwoods of Canada 1866-70; on the Western plains 1882-87. He became the official naturalist to the government of Manitoba, studied art in Paris, and is well known as an animal painter and illustrator. He has written many books on animal life, notable for their stories of striking animal intelligence. About 1898 he began the organization of a group of boy naturalists and athletes, known under the name of Seton Indians, from their adopting the Indian customs in their exercises. This organization gave the suggestion of the boy scout movement, now so widely popular. See *Boy Scouts.*

Setter (set'er), a breed of dogs, so named from their habit of crouching or 'setting' on observing the game which they are trained to hunt. The distinct races are the English, Irish and Russian setters. The two former have a narrower muzzle than the pointer, with the lower angle more rounded; the eye quick; the ears long, thin, and covered with wavy, silken hair; the tail with a fan-like 'brush' of long hair, and slightly curled at its tip; the hind legs and feet fringed. The Russian setter has thick woolly fur, the muzzle bearded, the soles of the feet hairy, and possesses a very keen scent. Crossed with the English it produces an admirably sharp variety.

Settle (set'l), ELKANAH, an English playwright who lives only in the ridicule heaped on him by Dryden and Pope. He was born at Dunstable in 1648; educated at Oxford; produced several plays — *Cambyses*, the *Empress of Morocco*, etc., and by his conceit provoked the scourge of Dryden. In his latter days he kept a booth at Bartholomew Fair. He died in the charter-house in 1723.

Settlement (set'l-ment), in law, (1) a deed by which property is settled; specially the general will or disposition by which a person regulates the disposal of his property, usually through the medium of trustees, and for the benefit of a wife, children, or other relatives; or the disposition of property at marriage in favor of a wife. (2) Legal residence or establishment of a person in a particular parish, town, or locality, which entitles him to maintenance if a pauper, and subjects the parish or town to his support. The *primâ facie* settlement of a pauper is the place of his birth, and this remains his settlement until he has acquired another settlement. In the United States a settlement may be acquired in various ways, to wit: by birth; by the legal settlement of the father, in the case of minor children; by marriage; by continued residence; by the payment of requisite taxes; by the lawful exercise of a public office; by hiring and service for a specified time; by serving an apprenticeship; and perhaps some others, which depend upon the local statutes of the different states. See *Poor.*

Setubal (sā-tö'bäl), or SETU'VAL, or as called by the English ST. UBES, a seaport of Portugal, on a bay of the Atlantic, at the mouth of the estuary of the Sado, 20 miles S. E. of Lisbon. It exports lemons, olives, oil, wine and great quantities of bay-salt. Pop. 22,074.

Sevastopol. See *Sebastopol.*

Sevenoaks (sev'en-ōks, or sen'ōks), a town in Kent, 22 miles S. E. of London. It stands on a ridge of hills, on one of which seven large oak trees are said to have grown, is situated in the midst of beautiful scenery, and is a favorite residential locality. There is a grammar school dating from 1432. Pop. 9183.

Seven Sleepers, a famous story of seven Christian youths of Ephesus imprisoned by order of the Emperor Decius in a neighboring cave in which they had sought refuge, and where they slept for nearly 200 years, awaking in the reign of Theodosius II to find, of course, a new civilization. They then related their story to the multitude, gave them their benediction, and expired. The church has consecrated the 27th of June to their memory. The Mohammedans have a similar legend. The basis of the Christian story is said to have been the fact that the dead bodies of seven youths so imprisoned were found in a cave, and the habit which Christian writers had of describing death as fall-

ing asleep in the Lord doubtless contributed to the miraculous character of the story. The conception has been secularized in the modern legend of Rip Van Winkle.

Seven Sorrows of the Virgin, Feast of, a Roman Catholic festival, instituted in 1725 by Pope Benedict XIII, and celebrated on the Friday before Palm Sunday. The seven sorrows commemorated by this feast are (1) the prediction of Simeon (Luke ii, 34, 35); (2) the flight into Egypt; (3) the loss of Jesus in Jerusalem; (4) the sight of Jesus bearing his cross; (5) the sight of Jesus on the cross; (6) the piercing of the side of Jesus; (7) the burial of Jesus.

Seven Stars. See *Pleiades.*

Seventeen-year Locust, *Cicada septendecim.* This remarkable insect begins and ends life in the open air, but spends 17 years in the earth. Safely hidden from sight, it feeds on the sap of tree-roots, and then, emerging into the light, completes its career in the tree branches. When the insect emerges from the ground after its 17 years' burial it works its body rapidly backward and forward like a man trying to put on an extremely tight coat. The result of the movement is the breaking of the shell which covers the creature and the immediate appearance of its wings. The remarkable power of instinct is shown as soon as the insect is freed of its enveloping armor. It makes instantly for the nearest tree and pairing here at once begins. The young, after a brief larval life above ground, penetrate the earth again, to remain there for the alloted 17 years. The habitat of this species is the northern United States. There is a variety farther south with a lifetime of 13 years. Broods of these insects appear in different years in separated localities. During their aerial life they do much damage to trees by injuring the bark of the new growth.

Seventh-day Adventists, a religious denomination originating in New England in 1844-45, when some of those connected with the Adventist movement of that period became convinced that the date of the Sabbath had never been changed by Divine authority. From New England the belief in this view spread westward, and in 1855 the headquarters of the society were removed to Battle Creek, Michigan, where its publishing, educational and sanitarium institutions were built. The denomination was formally organized under the name of Seventh-Day Adventists in 1863, and its headquarters were removed to Washington, D. C., in 1903. The distinctive doctrinal features of the Seventh-Day Adventist denomination are, the observance of the seventh day of the week (Saturday) as the Sabbath, according to the fourth commandment of the Decalogue: 'The seventh day is the Sabbath of the Lord thy God'; and the teaching that the second advent of Christ is near at hand. They hold that the example of Christ and the teaching of the New Testament are against any change in the day of rest. They base their views of the near coming of Christ on the fulfillment of the historical prophecies of Daniel and the Revelation, and on the instruction of Christ concerning the signs of his second coming in the twenty-fourth of Matthew and similar passages. They fix no date for the second advent. They believe in the Bible as the rule of faith and practice, in justification by faith, in the baptism of believers by immersion, and in life and immortality only in Christ. The leading publishing houses of the society in this country are located in Washington, Nashville and Mountain View (California), publishing interests being established also in a number of foreign countries, with mission presses in various mission fields. Books and periodicals are being issued in many languages, the sales now amounting to about one and a half million dollars annually. The denomination has given special attention to the teaching of health and temperance principles, believing this to be a part of gospel work. About forty medical sanitariums are operated by the denominational organizations in this and other countries. Eighty-three denominational colleges and academies were reported in 1909 in America and abroad. The membership of the church in 1912 was 104,526, about two-thirds of this number being in the United States.

Seventh-day Baptists. See *Baptists* and *Sabbatarians.*

Seventy, The. See *Septuagint.*

Seven Wise Masters, the title of a collection of early oriental tales, the plot of which is the following: a king's son, well educated by seven wise masters, finds by studying the stars that he is in danger of death if he speaks within seven days. The first day his stepmother, whose improper advances he had repulsed, accuses him to her husband of attempted violence, and demands his execution, at the same time telling the king a story to

obtain her end. One of the seven wise masters obtains a day's respite for the prince by telling a tale with a moral counteracting that of the stepmother's. Each day she renews her solicitations and stories to the king with the same object, but the effect of her tales is always nullified by another from one of the seven wise masters, until the expiration of the seven days enables the prince to reveal the designs of his stepmother.

Seven Wise Men, or SEVEN SAGES OF GREECE. As generally set down they were Periander of Corinth, Pittacus of Mitylene, Thales of Miletus, Solon of Athens, Bias of Priēnē, Chilo of Sparta and Cleobūlus of Lindus. Maxims of prudence and elementary morality are regarded as embodying a summary of their wisdom. Among these maxims are 'Know thyself,' 'Nothing in excess,' 'Consider the end,' etc.

Seven Wonders of the World, an old designation of seven monuments, remarkable for their splendor or magnitude, generally said to have been: the pyramids of Egypt, the walls and hanging gardens of Babylon, the temple of Diana at Ephesus, the statue of the Olympian Jupiter at Athens, the Mausoleum at Halicarnassus, the Colossus of Rhodes, and the Pharos or light-house of Alexandria.

Seven Years' War, a famous European war which lasted from 1756 to 1763. As the result of a war with Prussia (see *Prussia*) Maria Theresa of Austria had to cede Silesia to Frederick the Great. With a view to recover her lost territory she concluded an alliance with Russia, secured the support of Poland and Saxony, and attempted to form a closer union with France. In the meantime war, which already existed between the American colonies, broke out between France and England (1755), and George II, in order to protect his German states, concluded an alliance with Prussia, while France agreed to aid Austria against Frederick. Being informed of these negotiations, Frederick resolved to anticipate his enemies. In August, 1756, he invaded Saxony, occupied the chief towns, and compelled the Saxon army to surrender. This step created a stir in the European courts, and in 1757 Austria, Russia, France, Sweden, and the German Empire were in arms against Frederick, while he had no ally but England and a few German states. In 1757 Frederick marched into Bohemia and gained a bloody battle at Prague (May 6). Soon after, however, the Austrians under Daun defeated Frederick at Kollin (June 18), relieved Prague, and forced the Prussians to retreat to Saxony and Lusatia. The French army, after defeating Frederick's German allies (under the Duke of Cumberland) at Hastenbeck, united with the imperial forces; Frederick met them at Rossbach and routed both armies on Nov. 5. He then hurried back to Silesia, which was occupied by the Austrians, and vanquished a superior army under Daun at Leuthen (Dec. 5), thus recovering Silesia. While Frederick was thus occupied in the south and west, his general Lehwald had successfully repelled the Swedes and Russians on the north and east. The next campaign was opened in Feb., 1758, by Ferdinand, duke of Brunswick, who, at the head of Frederick's allies, opposed the French in Lower Saxony and Westphalia. He defeated the French at Krefeld in June, and ultimately drove the enemy behind the Rhine. Frederick, driven out of Moravia, defeated the Russians, who had advanced to Zorndorf, in Brandenburg, was defeated in turn by Daun at Hofkirchen, but before the end of the year drove the Austrians from Silesia and Saxony. Louis XV and his mistress, the Marchioness de Pompadour, were bent on continuing the war, and concluded a new alliance with Austria, Dec. 30, 1758. Frederick, however, had also obtained a new treaty with Britain, which promised him a large yearly subsidy. The new campaign was opened in March, 1759, Prince Henry, Frederick's brother, marching into Bohemia, where he dispersed the hostile forces, and captured immense quantities of military stores. The Russians, having defeated the Prussian general Wedel near Züllichau (July 23), advanced to Frankfort-on-the-Oder. Frederick hastened to meet them in person, and had already defeated them at Kunersdorf (Aug. 12) when his victory was snatched from him by the Austrians under Laudon, who inflicted on him a defeat such as he had never sustained before. Frederick's position was now extremely precarious. The Russians were victorious in his hereditary states, Daun was in Lusatia with a large army, and Saxony was overrun by the imperial troops. In the west Frederick's allies had been more successful. On Aug. 1 Ferdinand gained a splendid victory at Minden over the French troops under Contades and Broglio. On the same day his nephew defeated the French at Gohfeld, and they were driven over the Lahn on one side and over the Rhine on the other. The Swedes also, who, after the battle of Kunersdorf invaded Prussian

Pomerania, were driven by Manteuffel and Platen under the cannon of Stralsund. The campaign of 1760 seemed at first to forebode ill success to Frederick. While he himself was engaged in Saxony Fouqué suffered a defeat in Silesia, in consequence of which the Austrians occupied the whole country. Frederick thereupon gave up Saxony in order to recover Silesia. On August 15th he defeated Laudon at Liegnitz, by which he effected his purpose of recovering Silesia. He then returned to Saxony and attacked the imperial forces at Torgau, on the Elbe (Nov. 3), defeated them in a bloody engagement, and went into winter quarters in Saxony. The Russians also were forced to retire to Poland, and Ferdinand defeated the French at Marburg (July 31). In the campaign of 1761 the operations of Ferdinand of Brunswick and the French on the Rhine consisted of alternate advances and retreats, and the Russians and Austrians were so enfeebled that they failed to make any impression on Frederick's remnant of an army. In the campaign of 1762 the French were defeated (June 24) at Wilhelmsthal, and Cassel surrendered to the allies on Nov. 1. Two days after this the preliminaries of peace between Britain and France were signed, and the peace itself was confirmed at Paris, Feb. 10, 1763. After a short negotiation Frederick concluded a peace with Austria and Saxony at Hubertsburg (Feb. 15), by which he retained Silesia. The war in Europe was accompanied by war by sea and land between the French and British abroad, the result of which was to give Britain a decided superiority over France both in America and India, France surrendering all her colonies on the North American continent.

Severn (sev'ern), the second largest river in England, formed by the union of two small streams which rise in Mount Plinlimmon, Montgomeryshire, and after a circuitous southerly course of about 210 miles falls into the Bristol Channel. It receives the Tern, Upper Avon, and Lower Avon on the left, and the Teme and Wye on the right. Its basin has an area of 8580 square miles. It is navigable to Welshpool, about 178 miles above its mouth and 225 feet above sea-level. Below Gloucester its navigation is much impeded, but this has been obviated by a canal from this city to a point on the estuary 2 miles from Berkeley, capable of carrying vessels of 350 tons. Below Gloucester the banks become so low that destructive inundations have not unfrequently occurred. These have been partly caused by one of the most remarkable features of the river, its *bore*, or by the height of the tides, which at the mouth of the Avon sometimes exceed 48 feet, and at Chepstow attain even 60 feet.

Severus, ALEXANDER. See *Alexander Severus.*

Severus (se-vē'rus), LUCIUS SEPTIMIUS, a Roman emperor, born near Leptis, in Africa, of a noble family, in the year 146 A.D. He early showed an ambitious mind and great military ability. Under Commodus he commanded the legions in Pannonia, and on the murder of Pertinax in March, 193, was proclaimed emperor by his troops. Severus accordingly marched to Rome to subdue the partisans of Didius Julianus, who had purchased the imperial purple from the prætorians. On his approach Julian was assassinated by his own soldiers. Severus gained many adherents, banished the prætorians, and ridded himself of the rivalry of Albinus, commander of the Roman forces in Britain, by conferring upon him the title of Cæsar. He then marched to the East against Pescennius Niger, who had also been elected emperor by a powerful army. After many obstinate battles Niger was routed on the plains of Issus (A.D. 194). Having sacked Byzantium and conquered several eastern nations, Severus returned to Rome. He attempted to assassinate Albinus by his emissaries, but when this had failed of success he met him in battle on the plains of Gaul, near Lyons (February, 197), and was again victorious. The adherents of Albinus were destroyed, and on the return of Severus to Rome the richest of the citizens were sacrificed, and their property was confiscated by the emperor. Severus, with his two sons Caracalla and Geta, now marched to the East to repel an invasion of the Parthians, and subjugated Seleucia, Babylon, and Ctesiphon. Leaving Parthia he visited the tomb of Pompey the Great, and entered Alexandria. After subduing an insurrection in Britain, and building a stone wall from the Tyne to the Solway Firth as a defense against the incursions of the Caledonians, he died at York, A.D. 211.

Severus, WALL OF, the name given to the wall or barrier formed at the boundary of the Roman empire in Britain between the Solway and the Tyne by the Roman emperor Severus about 210 A.D., following the line of a similar structure made in the reign of Hadrian (A.D. 120), and usually called Hadrian's Wall. It was more than 70 miles long; on the north towards Scotland was a great ditch, on the southern

edge of this was a stone wall varying from 6 to 9 feet in breadth and about 16 feet high, with towers between 50 and 60 feet square at intervals of about a Roman mile. South of this was an earthen rampart, then a second ditch, backed by two minor earthen ramparts. At larger intervals were the stations or barracks Remains of it are still to be seen over long ranges of country.

Sévigné (sā-vēn-yā), MARIE DE RABUTIN-CHANTAL, MARQUISE DE, daughter of Bénigne de Rabutin, baron de Chantal, distinguished for her epistolary talents, born at Paris in 1626; died in Grignan, department of Drome, in 1696. In 1644 she married the Marquis de Sévigné, who was killed in a duel in 1651, leaving her the mother of a son and a daughter. She then devoted herself to the education of her children and to the culture of her own mind. In 1669 her daughter, to whom she was extremely attached, married the Count de Grignan, and shortly afterwards accompanied her husband to Provence. A seven years' separation from her daughter gave rise to the greater part of the *Letters* which have gained Madame de Sévigné so much reputation. After the year 1687 Madame de Sévigné was rarely severed from her daughter, and in May, 1694, went to live with her permanently. The subjects of many of the *Letters of Madame de Sévigné* are so entirely domestic as to produce little interest; but others abound with court anecdotes, remarks on men and books, and the topics of the day, which are conveyed with great ease and felicity. They are models of the epistolary style, perfectly natural from their expression, lively sentiment and description, and a playfulness which gives grace and interest to trifles.

Seville (se-vil'), SEVILLA (se-vēl'yȧ), a city of Spain, in Andalusia, on the left bank of the Guadalquivir, capital of a province of the same name, 62 miles N. N. E. of Cadiz. It is an archiepiscopal see, and is largely built in the Moorish style, with narrow, ill-paved streets, the old Moorish houses having spacious interior courtyards with a fountain in the middle. The city has a large and handsome Gothic cathedral dating from the fifteenth century, with its famous Moorish Giralda or tower, part of a mosque which gave place to the present cathedral, and dating from 1196; an alcazar or palace in the Moorish style; an exchange called the Casa Lonja; a bull-ring, a fine stone building holding 12,000 persons; an aqueduct of 410 arches built by the Moors, a university, a picture-gallery rich in examples of Murillo and Zurbaran; the house of Murillo, with collection of pictures; several interesting churches; an enormous hospital in the Grecian style, built in 1546; etc. On the other side of the river is the suburb of Triana, inhabited by gypsies, bull-fighters, etc. The manufactures include silks, cottons, woolens, pottery, machinery, chocolate, leather, and especially tobacco and cigars, there being an immense cigar factory in which some 5000 females are employed. The river is navigable for vessels of considerable size up to the city; a good trade is carried on, large quantities of oranges in particular being exported. Seville is one of the most ancient cities of Spain. Julius Cæsar gave it the title of *Romula*. It was the residence of the Gothic kings before they moved to Toledo in the sixth century. It surrendered to the Moors early in the eighth century, and remained in their possession till 1248, when Ferdinand III, king of Castile, after a year's siege, forced Seville to open its gates to him. At this time it is said to have contained 600,000 inhabitants; and upon the capitulation 300,000 Moors abandoned the city. After the discovery of America it became the center of the commerce of the New World, and was very flourishing; but the superior advantages of the port of Cadiz

Seville.— La Giralda and part of the Cathedral.

induced the government to order the galleons to be stationed at the latter place, after which it began to decline. In 1810 the city surrendered to Soult, who exercised great cruelties and extortion in it, till in 1813 he was forced by the British to evacuate it. In 1843 it was besieged for nine days by Espartero, when it capitulated. Pop. 148,315.—The province has an area of 5428 square miles, and the greater part consists of fertile plains, producing all kinds of cereals, seeds, vegetables, oranges and other fruits; wine, oil, tobacco, etc. Large numbers of horses are reared. The chief river is the Guadalquivir. Minerals include iron, silver, lead, and copper. The chief exports are wheat, barley, oranges, oil, wool, copper, etc. Pop. 555,256.

Sèvre (sāvr), the name of two rivers in N. W. France. The Sèvre Nantaise rises in the department Deux-Sèvres, and flows into the Loire opposite Nantes after a course of 86 miles. The Sèvre Niortaise rises 31 miles more to the southeast, in the same department, and flows into the Atlantic 10 miles north of La Rochelle after a course of 89 miles. The department of Deux-Sèvres takes its name from these two rivers.

Sèvres (sāvr), a town in France, department of Seine-et-Oise, near St. Cloud, on the Seine, here crossed by a handsome bridge. It is celebrated for its glass and porcelain manufactories. The porcelain of Sèvres is unrivaled for brilliancy of color and delicacy of execution. Previous to 1769 the chinaware made here was of soft porcelain alone, and is known as *Old Sevres;* subsequently it is of hard porcelain. The building in which the manufacture is carried on was founded in the middle of the eighteenth century, and since 1759 has been state property. Pop. (1906) 7949.

Sèvres, Deux (de*u*-sāvr; 'two Sèvres'), a department in France, bounded by Maine-et-Loire, Vienne, Charente, Charente-Inférieure, and Vendée; area, 2316 square miles. A branch of the Cevennes traverses the department from southeast to northwest. Cereals, leguminous crops, and hops are grown. The vine, though extensively cultivated, yields only an inferior wine. The forests are chiefly of hard wood. The minerals include iron, millstones, pavement, and limestone in abundance. The principal manufactures are linen and cotton goods, serge, flannel, woolen hosiery, and gloves. The capital is Niort. Pop. 342,474.

Sewage (sū'ij), the matter which passes through the drains, conduits, or sewers, leading away from human habitations singly, or from houses collected into villages, towns, and cities. It is made up of excreted matter, solid and liquid, the water necessary to carry such away, and the waste water of domestic operations, together with the liquid waste products of manufacturing operations, and generally much of the surface drainage water of the area in which the conveying sewers are situated. Until very recent times human excreta was deposited in outhouses or pits, commonly called cesspools. The invention of water-closets necessitated the use of the sewers, and the water-carriage of excreta was until lately regarded as the most satisfactory method of disposing of these matters. It was argued that the oxygen of the air held in solution by the water destroyed the organic matter and rendered it innoxious. But experience has shown that a large river can only oxidize the excreta of the towns on its banks, and that whenever these are passed into the rivers at some distance from the sea they are apt to become offensive. Sewage, when fresh and freely exposed to the air, is almost inodorous, but once it accumulates putrefaction sets in, it becomes vilely odorous, and pollutes the atmosphere by the production of poisonous gases. To prevent this it has been suggested that all sewers should have a greater fall than at present, and many attempts have been made to prevent the accumulation of gases in sewers by ventilation. Many methods for the ultimate disposal of sewage have been proposed, but these all may be divided into three great classes, viz.: *precipitation*, *irrigation*, and *filtration*, since the throwing of sewage into a body of water in order that it may be carried away by currents, diluted and oxygenated, has ceased to hold a place in modern sanitary schemes. The precipitation of sewage, by which the solid matter is separated from the liquid and used as a manure or otherwise, has been the subject of numerous patents and many chemicals have been employed for that purpose. Lime, lime and phosphate of alumina, and sulphate of iron have all been used with some degree of success. In the A B C process the sewage is first clarified by blood, charcoal, and clay, and afterwards treated with sulphate of alumina, producing a valuable manure. Irrigation — by which the sewage is directly applied to a piece of ground — has been fully tried in several localities, and many people consider it the most successful solution of the problem as to the ultimate disposal of sewage. The ground is carefully prepared, and the sew-

age allowed to flow over its surface by gravitation, and by this process the productiveness of the soil is enormously increased. But farmers will use the liquid only when their land requires it; consequently where this system is adopted the local authorities have had to add a farm trust to their many other responsibilities, and the system is generally carried out at a heavy annual loss to the public. Filtration — the purification of sewage by causing it to filter through the earth — has been proposed in cases where land is very valuable or difficult to be secured for the disposal of sewage, on the supposition that this system will require only one acre for every 10,000 inhabitants. As the sewage passes down through the earth the air must of necessity follow it, the oxygen of which will re-aerate the earth and make it again fit for use. But the chief objection to precipitation, irrigation, and filtration is that they can only be applied at the outfall, and therefore have no beneficial influence on the sanitary state of the localities from which the sewers flow. The most successful methods of dealing with the sewage difficulty are based on the principle of keeping all excremental matters out of the sewers and dealing with them so as to prevent decomposition. Moule's earth-closet has been successfully used in detached houses and villages in Great Britain, but the bulk of material renders it difficult to apply the system in towns. In the United States the disposal of sewage has received the earnest consideration of sanitarians. Experiments have been made to destroy refuse of large towns by the use of fire or its equivalent. In New York harbor, at Governor's Island; in Baltimore, at the Johns Hopkins University; in Allegheny City, Pa., such attempts have been partially successful. In the city of Milwaukee, Wisconsin, also in Des Moines, Iowa, large furnaces have been built with this end in view. In Pittsburgh the Rider furnace has been approved of as meeting the object proposed. Dry air closets, by which the noxious deposits are subject to a current of dry air, which renders them dry and changes them so as no longer to have the injurious effects of fecal discharges, are now being introduced. With regard to indoor drainage, care should be taken to see that each trap connected either with bath, water-closet, sink, or fixed basin is ventilated to the open air, and the pipe from the bath, sink, or fixed basin should never pass into the trap of the water-closet, as the heated water promotes decomposition. The overflow pipe from the cistern should not open into the soil pipe, and the main soil pipe should be of iron, well covered with protecting composition. Cesspools should in all cases be abolished.

Seward (sū'ärd), Anna, born at Eyam, Derbyshire, in 1747; died at Lichfield, where most of her life was spent, in 1809. She was intimate with Erasmus Darwin, and gained an unaccountable reputation as a poet. Sir Walter Scott published her *Poems and Correspondence* in 1810-11.

Seward, William Henry, statesman, born at Florida, Orange county, New York, May 16, 1801; died at Auburn, Cayuga county, in the same state, October 10, 1872. He studied for the bar, and began practicing in Auburn in 1823, but gradually drifted into politics, and in 1830 was elected a member of the New York senate. Displaying marked abilities as a politician, he was in 1838 and 1840 chosen governor of his native state, and in 1849 was elected to a seat in the United States Senate. He was the friend and adviser of President Taylor, and distinguished himself by his firm resistance to the extension of slavery. In 1860 he was a candidate for the presidency, but being defeated in the convention by Abraham Lincoln he exerted himself to secure Lincoln's election. Lincoln afterwards nominated Seward as Secretary of State for foreign affairs, in which post he discharged his duties with great ability. He was dangerously wounded in April, 1865, when Lincoln was assassinated, but recovered and fulfilled the same office under Lincoln's successor, Andrew Johnson. He resigned his post on the accession of President Grant in 1869. He wrote a *Life of John Quincy Adams;* his *Speeches, Correspondence,* etc., appeared in 1869; and an *Autobiography,* with continuation, in 1877.

Sewell (sū'el), Elizabeth Missing, a novelist, born in the Isle of Wight in 1815, daughter of a solicitor. She became well known as the authoress of *Amy Herbert* (1844), *Gertrude* (1845), *Lanceton Parsonage* (1846), *Margaret Perceval* (1847), and other novels of the so-called High Church School of Fiction. She also wrote works of travel, poems, and several elementary historical works. — Her brother William (born 1805; died 1874), was educated at Oxford, became incumbent of Carisbrook, and published religious and literary treatises and translations of the classics.

Sewellel (sew-el'el; *Haplodon rufus*), a small rodent animal of the United States, inhabiting California, Oregon, and Washington. It has characters that unite it both with the beaver and

the squirrels or marmots. It lives in colonies in underground burrows, and feeds on vegetable substances. It is about 12 inches long, stoutly built, and has almost no tail.

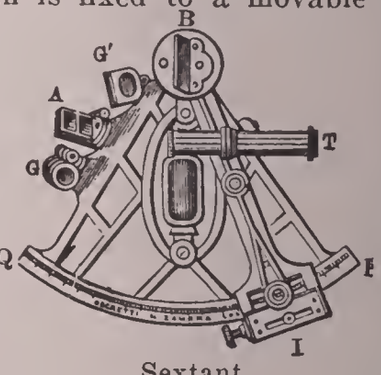
Sewing-machines. The first attempts to devise machines for replacing hand labor in sewing are as old as the eighteenth century. The first machines were contrivances for imitating mechanically the movements of the hand in sewing. In the machines of Thomas Stone and James Henderson (1804) there were two pairs of pincers, one of which seized the needle below and the other above the cloth, and pulled it quite through on either side alternately. In Heilmann's machine, exhibited at Paris in 1834, the needle had the eye in the middle and a point at each end. This machine was intended for embroidery work. Previous to this (in 1830) Thimmonier and Ferrand had contrived a machine producing what is known as the chain-stitch. But the great disadvantage of this stitch is that the whole seam becomes undone if the end of the thread is pulled. In 1854 Singer, an American, devised a machine calculated to remedy this defect of the chain-stitch by means of a mechanism for tying a knot in the seam at every eighth stitch. But long before Singer's invention Elias Howe, a poor American mechanic, had invented the first really satisfactory sewing-machine, for which he obtained a patent in May, 1841. Howe's machine used two threads, one of which passed through the eye of the needle, while another was contained in a small shuttle; and it produced a seam in which each stitch was firmly locked, so that it could not come undone by pulling. Many improvements have since been made by other inventors. The principle of the two threads and the lock-stitch has been adhered to in most of the machines that have been invented subsequently to that of Howe, but various details applying that principle have been altered for the better. In the Wheeler and Wilson machine the place of the shuttle is supplied by a reel which revolves in a vertical plane within a round piece of mechanism so contrived as to form a loop with the reel-thread, which becomes interlocked with that held by the needle. Of single-thread machines one of the best is that of Wilcox and Gibbs, which, while it is easy, quick, and noiseless in working, makes a securer stitch than one-thread machines generally. Sewing-machines have now been adapted to produce almost all kinds of stitching which can be done by the hand. Most sewing-machines are worked by the foot, but many are worked by the hand, and some may be worked by either. Steam and electricity are also frequently employed as a motive power for sewing-machines. The manufacture of sewing-machines is most extensively carried on in America. In Great Britain also large numbers are now made — chiefly in or near Glasgow.

Sex, the name applied to indicate the particular kind of generative or reproductive element in the constitution of an animal or plant, being that property or character by which an animal is male or female. Sexual distinctions are derived from the presence and development of the characteristic generative organs — *testes* and *ovary* — of the male and female respectively. See *Reproduction.*

Sexagesimals (sek-sa-jes'i-malz), or SEXAGESIMAL FRACTIONS, fractions whose denominators proceed in the ratio of sixty; as, $\frac{1}{60}$, $\frac{1}{3600}$, $\frac{1}{216000}$. These fractions are called also astronomical fractions, because formerly there were no others used in astronomical calculations. They are still retained in the division of the circle, and of time, where the degree or hour is divided into sixty minutes, the minutes into sixty seconds, and so on.

Sexagesima Sunday, the second Sunday before Lent, the one immediately before Shrove Tuesday, so called because it falls about sixty days before Easter.

Sextant (seks'tant), an improved form of quadrant, capable of measuring angles of 120°. It consists of a frame of metal, ebony, etc., stiffened by cross-braces, and having an arc embracing 60° of a circle. It has two mirrors, one of which is fixed to a movable index, and various other appendages. It is capable of very general application, but it is chiefly employed as a nautical instrument for measuring the altitudes of celestial objects, and their apparent angular distances. The principle of the sextant, and of reflecting instruments in general, depends upon an elementary theorem in optics, viz., if an object be seen by repeated reflection from two mirrors which are perpendicular to the same plane, the angular distance of the object



Sextant.

from its image is double the inclination of the mirrors. The annexed figure shows the usual construction of the sextant. QP is the graduated arc, BI the movable index, B mirror fixed to the index, A mirror (half-silvered, half-transparent), fixed to the arm, GG′ colored glasses, that may be interposed to the sun's rays. To find the angle between two stars hold the instrument so that the one is seen directly through telescope T and the unsilvered portion of the mirror, and move the index arm so that the image of the other star seen through the telescope by reflection from B and A is nearly coincident with the first, the reading on the arc gives the angle required; half degrees being marked as degrees, because what is measured by the index is the angle between the mirrors, and this is half that between the objects.

Sexton (seks′tun), a corruption of *sacristan*, an under officer of the church, whose business, in ancient times, was to take care of the vessels, vestments, etc., belonging to the church. The greater simplicity of Protestant ceremonies has rendered this duty one of small importance, and the sexton's duties now consist in taking care of the church generally, to which is added the duty of digging and filling up graves in the churchyard.

Sextus Empiricus (seks′tus empir′i-kus), a celebrated skeptic who flourished in the first half of the third century A.D. He was probably a Greek by birth, and he is said to have lived at Alexandria and Athens. Scepticism appears in his writings in the most perfect state which it had reached in ancient times, and its object and method are more clearly developed than they had been by his predecessors. (See *Scepticism*.) We have two works by him, written in Greek, one, entitled *Outlines of Pyrrhonism*, explains the method of Pyrrho; the other, entitled *Against the Mathematicians*, is an attempt to apply that method to all the prevailing philosophical systems and other branches of knowledge.

Seychelles (sā-shel′), a group of about thirty islands in the Indian Ocean, between lat. 3° 40′ and 5° 35′ S., and lon. 55° 15′ and 56° E. They were first occupied by the French, and were ceded to the British in 1814. The settlers are mostly of French extraction. The largest island is Mahé, the majority of the others being mere rocks. With the exception of two consisting of coral, they are composed of granite piled up in huge masses, and terminating in peaks. Most of them are covered with verdure, and yield good timber. Coffee, vanilla, etc., are exported. Pop. 25,000.

Seymour (sē′mor), a town of New Haven Co., Conn., on Naugatuck River. Has manufactures of brass, cotton and rubber goods. Pop. 6781.

Seymour, a city of Jackson Co., Indiana, 59 miles S. of Indianapolis. It has railroad repair shops and manufactures of flour, furniture, harness, hubs, woolens, etc. Pop. 7348.

Seymour (sē′mur), a noble English family of Norman origin. Their name is corrupted from St. Maur, which was their seat in Normandy. They acquired lands in Monmouthshire in the thirteenth century, and early in the fifteenth century added to these estates others in Somersetshire. The first conspicuous member of this family, SIR JOHN SEYMOUR, was the father of the third wife of Henry VIII and of Edward Seymour who, on his sister's marriage in 1536, was raised to the peerage as Viscount Beauchamp, and the following year created Earl of Hertford. During the minority of Edward VI the Earl of Hertford caused himself to be appointed governor of the king and protector of the kingdom (January, 1547). The following month he obtained the post of lord-treasurer, was created Duke of Somerset, and made earl-marshal. The success of his expedition against Scotland (1547) excited the jealousy of the Earl of Warwick and others, who procured his confinement in the Tower in October, 1549. He was deprived of his offices and honors and heavily fined. Six months later he obtained a full pardon, was admitted to court, and ostensibly reconciled to Warwick. The latter, however, caused Somerset to be again arrested in October, 1551, on a charge of treasonable designs against the lives of some of the privy-councilors. He was tried, and beheaded on Tower Hill in January 1552.—His brother, THOMAS, Lord Seymour of Sudeley, was made a peer and lord high-admiral of England by the protector. He married Catherine Parr, widow of Henry VIII, and was continually plotting against his brother. In 1548 he was attainted of treason, and he was executed in 1549.—The eldest son of the protector was created by Elizabeth Earl of Hertford, and the grandson of this Earl of Hertford having distinguished himself in the royalist cause, obtained in his favor the revival of the title of Duke of Somerset in 1660.

Seymour, HORATIO, statesman, born at Pompey Hill, Onondaga Co., New York, in 1810. After serving three terms, with marked ability, in the

New York legislature, in 1852 was elected governor on the Democratic ticket. At the outbreak of the Civil War he was decidedly in favor of the supremacy of the constitution, and as governor showed conspicuous energy and ability in raising troops. He was elected governor again in 1862, but was defeated for this office in 1864. In 1868 he was the Democratic nominee for the presidency, but was defeated by General Grant. As an orator Mr. Seymour was easy, agreeable and powerful, rising often into true eloquence. He died February 12, 1886.

Sfax (sfäks), a town on the east coast of Tunis, situated in the midst of fruit gardens. It is surrounded by walls and bastions, and has a strong citadel. It exports large quantities of fruit, wool, sponges, alfa, etc. Sfax was captured by the French after a two days' bombardment, on July 16, 1881. Pop. 45,000.

Sforza (sfort'sa), a celebrated Italian family, which played an important part in the fifteenth and sixteenth centuries, gave six rulers to Milan, and formed alliances with most of the princely houses of Europe. The founder of the house was a peasant of Cotignola, in the Romagna, by name Muzio Attendolo (1369-1424), who from a woodcutter became a great condottiere and received from Count Alberigo de Barbiano the name of Sforza. His natural son Francesco Sforza (died 1466) became Duke of Milan. Others who held the dukedom were Galeazzo Maria Sforza, 1466-76; John Galeazzo Sforza, 1476-91; Lodovico-Maria Sforza ('Il Moro'), 1494-1500; Massimiliano Sforza, 1512-15.

Shackleton (s h a k' e l - t o n), Sir Ernest Henry, polar explorer, born in Kilkee, Ireland, in 1874; died in 1922. He entered Dulwich College in 1886, but left before completing his course, following a natural inclination to go to sea. He circumnavigated the globe at least four times, and during the South African war took part in the transportation of troops. His first real chance for distinction came in 1901 when he was chosen third lieutenant in the National Antarctic Expedition which sailed south that year under Captain Scott. He was one of the four members of the party which attempted to reach the pole by sledge, and which penetrated several hundred miles nearer the objective than had any previous explorers.

Returning home, he was for a time secretary to the Scottish Geographical Society, but resigned in 1906, was defeated in a contest for parliament, and in 1907 organized an Antarctic expedition under his own leadership, in the steamer *Nimrod*. On October 29, 1908, he headed a sledging party journeying over the ice toward the South Pole. On January 16, 1909, they reached much the greatest southing made to that time, a point 97 miles from the pole, the elevation being 11,600 feet above sea-level. Parties from the same expedition ascended Mount Erebus and reached the South Magnetic Pole, fixing its location at 72° 25′ S. lat., 155° 16′ E. lon. He made a third expedition to the south polar region in 1914, shortly before the outbreak of the World War. This expedition was prolific of valuable geologic and scientific surveys. The ship *Endurance*, on which he made the voyage, was crushed in an ice-floe in October, but drifted till midwinter, when the explorer and his party made a landing on Elephant Island in the South Shetlands. Shackleton, in a small boat, and with a company of five men, left Elephant Island for Port Stanley in the Falkland Islands, seeking aid for the 22 men who had been left behind. Ultimately the entire party was rescued. During the World War he was attached to the Murmansk expedition of the British army; in the North Russia winter campaign.

In September, 1921, Shackleton set sail from England on board the *Quest*, a little 200-ton boat, on what was to have been a two-year voyage to the uncharted regions of the Antarctic. On January 5, 1922, he died on board the *Quest*, off South Georgia Island. His body was brought to Montevideo, Uruguay, on board a Norwegian steamer. He was knighted in 1909. His books include *The Heart of the Antarctic*, *The Diary of a Troopship*.

Shad, a name of several fishes, of the family of Clupeidæ or herrings, and including two European species, the common or allice shad *(Clupea alosa)* and the twaite shad *(C. finta)*, and one American species *(C. Sapidissima)*. The common shad inhabits the sea near the mouths of large rivers, and in the spring ascends them for the purpose of depositing its spawn. The form of the shad is the same as that of the other herrings, but it is of larger size, and in some places receives the name of 'herring king.' Its color is a dark blue above, with brown and greenish lusters, the under parts being white. The twaite shad is about a half less than the allice species and weighs on an average about 2 pounds. The American species of shad varies in weight from 4 to 12 pounds, and is highly esteemed for food, it being one of the most savory of food fishes. It is consumed in great quantities in the fresh

state, being taken in nets during its ascent of the rivers. Shad are found all along the coast from New England to the Gulf of Mexico, and have been successfully introduced on the Pacific coast.

Shad-bush. See *June-berry.*

Shaddock (shad'uk; *Citrus decumāna*), sometimes called *pompelmoose*, a large species of orange, attaining the diameter of 7 or 8 inches, with a white, thick, spongy, and bitter rind, and a red or white pulp of a sweet taste, mingled with acidity. It is a native of China and Japan, and was brought to the West Indies by a Captain Shaddock, from whom it has derived its name. Under the name of grape fruit it is now a favorite relish on American tables.

Shadoof, SHADUF (sha-döf'), a contrivance extensively employed in Egypt for raising water from the Nile for the purpose of irrigation.

Raising water by Shadoofs.

It consists of a long stout rod suspended on a frame at about one-fifth of its length from the end. The short end is weighted so as to serve as the counterpoise of a lever, and from the long end a bucket of leather or earthenware is suspended by a rope. The worker dips the bucket in the river, and aided by the counterpoise weight, empties it into a hole dug on the bank, from which a runnel conducts the water to the lands to be irrigated. Sometimes two shadoofs are employed side by side. When the waters of the river are low two or more shadoofs are employed, the one above the other. The lowest lifts the water from the river and empties it into a hole on the bank, a second dips into this hole, and empties the water into a hole higher up, and a third dips into the hole just below, and empties the water at the top of the bank, whence it is conveyed by a channel to its destination.

Shadow (shad'ō), the figure of a body projected on the ground, etc., by the interception of light. *Shadow*, in optics, may be defined a portion of space from which light is intercepted by an opaque body. Every opaque object upon which light falls is accompanied with a shadow on the side opposite to the luminous body, and the shadow appears more intense in proportion as the illumination is stronger. An opaque object illuminated by the sun, or any other source of light which is not a single point, must have an infinite number of shadows, though not distinguishable from each other, and hence the shadow of an opaque body received on a plane is always accompanied by a *penumbra*, or partial shadow, the complete shadow being called the *umbra*. See also *Penumbra.*

Shadwell (shad'wel), THOMAS, an English dramatic poet, born at Stanton Hall, Norfolk, in 1640, educated at Cambridge, studied the law for some time at the Middle Temple, and then visited the Continent. On the recommendation of the Earl of Dorset he was created poet-laureate in the place of Dryden, whose bitter enmity against Shadwell found expression in his severe satire of Mac Flecknoe. He died in 1692, in consequence, it is supposed, of taking too large a dose of opium. Although coarse, his comedies are not destitute of genuine humor.

Shafter (shaf'ter), WILLIAM RYFUS, soldier, was born at Galesburg, Michigan, October 16, 1833. He entered the Union army as lieutenant of volunteers in 1861, remained in it through the Civil war, and was mustered out as brevet brigadier-general in 1865. In the following year he entered the regular army as lieutenant-colonel, was promoted colonel in 1879, and brigadier-general in 1897, in charge of the department of California. On May 4, 1898, he was placed in charge of the army of invasion of Cuba, and conducted the operations against Santiago until the surrender of the Spanish forces. He subsequently returned to the department of California, and died November 12, 1906.

Shaftesbury (shâfts'bur-i), ANTHONY ASHLEY COOPER, FIRST EARL OF, was born at Wimborne St. Giles's, in Dorsetshire, in 1621, and succeeded to a baronetcy on the death of his father in 1631. After leaving Exeter College, Oxford, he studied law at Lin-

coln's Inn, and was chosen representative for Tewkesbury in 1640. At the commencement of the Civil war he supported the royal cause, but advised mutual concession. Finding that in consequence of this opinion he was distrusted by the court he joined the parliament, and received command of its forces in Dorsetshire. When Cromwell turned out the Long Parliament, Sir Anthony was one of the members of the convention which succeeded, nevertheless he signed the protestation charging the protector with arbitrary government, which did not, however, prevent him from becoming one of his privy-council. After the deposition of Richard Cromwell he aided the restoration of Charles II with all his influence, and in 1661 was created Baron Ashley, and appointed chancellor of the exchequer and a lord of the treasury. Yet he strongly opposed the Corporation Act (1661) and the Act of Uniformity (1662), both measures favored by the crown. He afterwards became a member of the obnoxious Cabal. In 1672 he was created Earl of Shaftesbury and lord high chancellor. His conduct on the bench was able and impartial, but he was deprived of office, probably through the influence of the Duke of York; and he at once became one of the most powerful leaders of the opposition. For his warmth in asserting that a prorogation of fifteen months amount to a dissolution of parliament he was confined in the Tower from Feb., 1677 to Feb., 1678. After his liberation he took a prominent part in the attacks on Catholics during the popish plot scare. In 1679 he became president of the council and the same year was instrumental in passing the Habeas Corpus Act. In 1681 he was indicted for high treason but acquitted. He entered into the plots of the Monmouth party and had to fly to Holland, where he died in 1683. He is the *Achitophel* of Dryden's famous satire.

Shaftesbury, Anthony Ashley Cooper, third Earl of, grandson of the preceding, a celebrated philosophical and moral writer, was born at Exeter House, in London, in 1671; died at Naples in 1713. A few years before he died his works were collected and published under the title of *Characteristics of Men, Manners, Opinions and Times.*

Shaftesbury, Anthony Ashley Cooper, Seventh Earl of (1801-85), one of the great English philanthropists. Through the Factory Act of 1847 he reduced the hours of labor, and put a stop to the employment of boys in mines, and introduced many other reforms.

Shag (*Gracŭlus cristātus*), a species of cormorant, also called the crested or green cormorant, from its dark-green plumage. Its average length is about 26 inches, and its nest, composed of roots and stalks of sea-weed lined with grass, is usually found on rocky ledges. The young birds have a brownish tint amid the green plumage, with brown and white under-surfaces.

Shagreen (sha-grēn′), a species of leather prepared without tanning, from horse, ass, and camel skin, the granular appearance of its surface being given by imbedding in it, whilst soft, the seeds of a species of plant, and afterwards shaving down the surface, and then by soaking causing the portions of the skin which had been indented by the seeds to swell up into relief. It is dyed with the green produced by the action of sal-ammoniac on copper filings. It is also made of the skins of the shark, sea-otter, seal, etc. It was formerly much used for watch, spectacle, and instrument cases.

Shah (shå), in Persian, signifies 'king.' The proper title of the king in Persia is *Shah-in-shah*, King of kings.

Shah Jehan (je-hån′), the fifth Mogul emperor of Delhi, reigned from 1627 to 1658, when he was deposed by his son Aurengzebe. During his reign the Mogul Empire attained a great magnificence; he founded Delhi, where he erected the celebrated peacock throne, valued at $33,000,000; built the beautiful Taj Mahal at Agra, a mausoleum to his favorite wife, and several other buildings which have become architecturally famous. He died at Agra in 1666.

Shahjehánpur (shä-ju-hän′pör), a town in India, in the Northwest Provinces, 95 miles northwest of Lucknow, in the executive district of the same name. There is a cantonment at the place, an American Methodist mission station with churches and schools; and sugar works in the neighborhood. Pop. 75,128.

Shairp (shārp), John, poet and critic, born at Houstoun House, Linlithgow, in 1819; died in 1885. He was educated at Edinburgh Academy, Glasgow University and Baliol College, Oxford. After a term as assistant-master at Rugby he was appointed professor of humanity in the united College of St. Salvador and St. Leonards at St. Andrews in 1861, becoming principal in 1868. From 1871 he also held the chair of poetry at Oxford. His works consist of *Kilmahoe, a Highland Pastoral, and*

other Poems (1864); *Studies in Poetry and Philosophy* (1868); *Culture and Religion* (1870); *Poetic Interpretation of Nature* (1877); *Burns*, in the *Men of Letters* Series (1879); and *Aspects of Poetry* (1881).

Shakers (shā'kerz), or SHAKING QUAKERS, a sect which arose at Manchester, in England, about 1747, and was eventually transferred to the United States, where it now consists of a number of thriving *families*. The formal designation which they give themselves is the United Society of Believers in Christ's Second Appearing. That of Shakers was given them in ridicule, but is nevertheless passively accepted by them. The founder of the sect as it at present exists was Ann Lee, an expelled Quaker, born in Manchester in 1756. She went to America in 1774 with seven followers and formed the first settlement at Watervliet, near Albany. They agree with the Quakers in their objections to take oaths, their neglect of certain common courtesies of society, their rejection of the sacraments, etc. They believe in the immediate revelations of the Holy Ghost (gifts); maintain that the old law is abolished, the new dispensation begun; that intercourse between heaven and earth is restored; that God is king and governor; that the sin of Adam is atoned, and man made free from all errors except his own; that every human being will be saved; that the earth is heaven, now soiled and stained, but ready to be brightened by love and labor into its primeval state. At first the motions from which they derive their name were of the most violent, wild, and irregular nature — leaping, shouting, clapping their hands, etc.; but at present they move in a regular, uniform dance to the singing of a hymn, and march round the hall of worship, clapping their hands in regular time. The societies are divided into smaller communities called families, each of which has its own male and female head. Celibacy is enjoined upon all, and married persons on entering the community must live together as brother and sister. All property is held in common, and all bind themselves to take part in the family business — the men either as farmers, builders, gardeners, smiths, painters, or as followers of some other handicraft; and the women in some household occupation, or in the work of education. The membership at present is only about 500. A party of about 100 settled in the New Forest, Hampshire, about 1871, and were evicted for debt in the winter of 1874, when they suffered much from the severe weather. After the death of their leader, Mrs. Girling, the community dispersed.

Shakespeare, SHAKSPERE (shāk'spēr), WILLIAM, a famous poet and dramatist, was born in 1564, at Stratford-upon-Avon, a small town in Warwickshire, England. It is known (from the parish register of his birthplace) that he was baptized on the 26th of April, and from this it has been considered probable that he was born on 23d April. His father was John Shakespeare, a burgess of Stratford, who combined his business as a butcher, a woolstapler, and a glover with dealings in timber and corn. His mother was Mary Arden, daughter of Robert Arden of Wilmecote, a prosperous yeoman farmer. They had eight children (four sons and four daughters), of whom William was the

William Shakespeare, from monumental bust at Stratford-upon-Avon.

third. When the third son was born and for some time afterwards the family were prosperous, for we find that in 1568 John Shakespeare was high-bailiff of Stratford. From this fact it may safely be inferred that his son received the best education which the grammar-school of Stratford could give. How long the boy remained at school is not known, but it is assumed that he may have been withdrawn about his fourteenth year, owing to the difficulties which in 1578 had overtaken his father's financial affairs. Concerning his occupation after leaving school we are free to choose among the various traditions which report that he was apprenticed to a butcher, that he was for some time a schoolmaster, and

that he was a lawyer's clerk. Passing from conjecture, the first absolutely authentic event in Shakespeare's life is his marriage with Anne Hathaway, daughter of a yeoman in the hamlet of Shottery, near Stratford. The marriage bond is dated November 28, 1582, at which date Shakespeare was in his nineteenth year, while, from the date on her tombstone, it is known that his wife was eight years older. On the 26th of May following their first child, named Susanna, was baptized, and in February of 1585 a son and daughter were born, who received the names of Hamnet and Judith.

From this date until we find Shakespeare established in London as a player and dramatist there is a gap of seven years, during which we are again left to tradition and conjecture. To account for his leaving Stratford it has been suggested that his marriage with Anne Hathaway had proved unsuitable and unhappy, but there is no positive evidence in support of this belief. Then, again, there is the famous legend of the deer-stealing for which it is said he was prosecuted by Sir Thomas Lucy of Charlecote. In retaliation he wrote, according to Rowe, a satirical ballad which so enraged the baronet that Shakespeare thought it prudent to leave Stratford. The more probable reason is, that his increasing domestic responsibilities, together with the acquaintance he presumably had with the players from London who visited Stratford, induced him to push his fortune in the city. What was his occupation at the outset of his London life is also doubtful. Tradition has it that he tended the horses of those who rode to the plays, and with such success that he organized a company of youthful assistants who were known as Shakespeare's boys. There is probably little truth in this story. What is certain, however, is the fact that he soon became a well-known player and a dramatist of such distinction as to call forth an envious reference in 1592 from a fellow-dramatist. This is found in a Groatsworth of Wit, written by Robert Greene, and published a few weeks after his death by Chettle. In this piece Greene describes a rival dramatist as 'an upstart crow beautified in our feathers, that, with his *tygre's heart wrapt in a player's hyde*, supposes he is as well able to bombast out a blank verse as the best of you, and being an absolute *Johannes fac totum*, is, in his own conceit, the only Shakscene in a country.' While this may certainly be accepted as having reference to Shakespeare, the supposed allusion in Spenser's *Tears of the Muses* (1590-91) to Shakespeare as 'our pleasant Willy' is not easily established.

The first date in Shakespeare's life, after his arrival in London, which is settled by clear evidence is 1593. In that year he published his *Venus and Adonis*, with a dedication of this, 'the first heir of my invention,' to Henry Wriothesly, earl of Southampton; and in the following year he dedicated to the same patron his other poem of *The Rape of Lucrece*. As suggesting that this patronage was substantial in its nature, there is a story to the effect that the earl at one time gave Shakespeare £1000 to complete some purchase he had on hand. Whatever truth there may be in the story, it is certain that about this time Shakespeare began to grow in fortune and in fame. In the accounts of the treasurer of the chamber it is set down that he appeared, along with Burbage and other players, before Queen Elizabeth in the Christmastide of 1594. He must, also, at this period have been producing his earlier plays and thriftily accumulating the wealth which they were likely to bring. In connection with this increase of fortune it is noteworthy that the affairs of his father, John Shakespeare, seem also to have improved, for in 1596 he applied at the herald office for a grant of arms, which application was conceded in the following year. In 1596 Shakespeare's only son Hamnet died and was buried at Stratford, where the family continued to reside. The tradition is that Shakespeare visited his native town once a year during the time that he lived in London. However this may be, it is clear that his interest in Stratford was not founded entirely in sentiment or family affection, for we find that in 1597 he bought a substantial house called New Place for £60; and in a return of grain and malt he is described as the holder of ten quarters. There is also documentary evidence to prove that he was possessed of property in the parish of St. Helen's, Bishopgate. That he was a man of some public importance in London is also indicated by a letter dated 1598, and still extant, in which Abraham Sturley suggests to Richard Quiney that by the friends of Mr. Shakespeare he might be helped to certain favors which they desired conferred on their native town of Stratford; and that the player and dramatist was a man able and likely to be generous with his friends is suggested by an extant letter in which this same Richard Quiney applies to Shakespeare for a loan of £30.

While these things indicate the growth

of his material prosperity, we have proof that his fame as a lyrical poet and dramatist was also being securely established. For in 1598 there was published the *Palladis Tamia*, by Francis Meres, in which twelve of his plays are enumerated; and in which mention is made of his 'sugred sonnets among his private friends.' Yet, notwithstanding this literary activity, he was still a player, for when Jonson's comedy of *Every Man in his Humour* was produced in 1598, Shakespeare took part in the performance. In the following year we find that he was a shareholder in the Globe Theater, and his practical turn is still further evidenced by the fact that he bought (1602) 107 acres of arable land in the parish of Old Stratford for £320, and acquired (1605) for £440 the unexpired term of a lease of the tithes of Stratford, Old Stratford, Bishopton, and Welcombe. Along with these material possessions he received the style and title of William Shakespeare, Gentleman, of Stratford-on-Avon; but in London he was still a player in 1603, since we know that when Ben Jonson's play of *Sejanus* was produced in that year Shakespeare occupied a place in the list of actors. At what time he ceased to appear upon the stage is not known; we are even left in doubt when he ceased to live in London and retired to Stratford, though this was probably between the years 1610 and 1612. His father, John Shakespeare, had died in 1601; his elder daughter Susanna had married, in 1607, a practicing physician named John Hall; in the same year his brother Edmund, who was also a player, died in London and was buried in Southwark, the author of *Hamlet* paying twenty shillings for 'a forenoon knell of the great bell'; and in 1608 his mother, Mary Shakespeare, followed her husband to the grave. Of his life in Stratford after his return we have no information except doubtful stories and a few scraps of documentary evidence. The latter chiefly prove that he continued to retain a keen interest in the everyday facts of the world. Thus we find him, in 1611, subscribing towards the expenses of a Stratford road-bill in parliament; buying a house in Blackfriars, London, for £140; engaging in a chancery suit with reference to his tithes in Stratford; and opposing the inclosure of some common lands at Welcombe. In February, 1616, his younger daughter Judith married Thomas Quiney, a vintner of Stratford; on the 25th of the following month he executed his will; and in another month he was dead. The cause of his death is unknown, but in Stratford there was a tradition 'that Shakespeare, Drayton, and Ben Jonson had a merry meeting, and, it seems, drank too hard, for Shakespeare died of a fever there contracted.' By his will he left the bulk of his property to Susanna Hall and her husband, his daughter Judith, his sister Joan, and his godson, while a few friends and fellow-players were also remembered. To his wife he bequeathed specifically the 'second-best bed with the furniture'; for otherwise there would probably be ample provision made for her as a widow having right of dower in her husband's freehold property. He was buried in the chancel of Stratford church, on the north wall of which a monument, with bust and epitaph, was soon afterwards set up. The face of this bust, which may have been modeled from a cast taken after his death, was colored, the eyes being hazel, the beard and hair auburn. This bust, and the portrait engraved by Droeshout, prefixed to the first folio edition of his writings (1623), are the chief sources of our information regarding the appearance of the poet. There is also a death-mask dated 1616, and what is known as the Chandos portrait, which are interesting but not authoritative. As for his character, as estimated by his contemporaries, it found fit expression in the words of Ben Jonson. 'I loved the man,' he said, 'and do honour his memory on this side idolatry as much as any. He was indeed honest, and of an open and free nature, had an excellent phantasy, brave notions, and gentle expressions.' Seven years afterwards (1623) his wife, Anne Hathaway, died. His daughter Judith, whose three children died in childhood, survived him until 1662, while his elder daughter, Susanna, died in 1649, leaving one daughter named Elizabeth. This grandchild of the poet's was married first to Mr. Thomas Nash of Stratford, and then to Sir John Barnard, but in 1670 she died childless, and thus the family of Shakespeare became extinct.

In classifying the plays of Shakespeare by the aid of such chronology as is possible, modern critics have found it instructive to divide his career as a dramatist into four marked successive stages. The *first period* (1588-93) marks the inexperience of the dramatist, and gives evidence of experiment in characterization, looseness in the construction of plot, with a certain symmetrical artificiality in the dialogue. To this stage belong: — *Titus Andronicus* (1588-90) and *part I Henry VI* (1590-91), both of which, it is thought, Shakespeare

merely retouched; *Love's Labour's Lost* (1590); *The Comedy of Errors* (1591); *The Two Gentlemen of Verona* (1592-93); *A Midsummer Night's Dream* (1593-94); *Parts II and III Henry VI* (1591-92), in which it is thought probable that Marlowe had a hand; and *King Richard III* (1593). The *second period* (1594 to 1601) is that in which, with increased security in his art, the dramatist sets forth his brilliant pageant of English history, his brightest conception of the comedy of life, and more than proves his capacity for deeper things by one great romantic tragedy. To this stage belong: — *King Richard II* (1594); *parts I and II Henry IV* (1597-98); *King Henry V* (1599); *King John* (1595); *Romeo and Juliet* (1596-97); *The Merchant of Venice* (1596); *Taming of the Shrew* (1597); *Merry Wives of Windsor* (1598); *Much Ado about Nothing* (1598); *As You Like It* (1599); and *Twelfth Night* (1600-01). The *third period* (1602-08) shows that the dramatist, having mastered all the resources of his art and tasted life to the full, is strangely fascinated by mortal mischance, so that even his comedy becomes bitter, while his tragedy is black with the darkest tempests of passionate human experience. To this stage in his development belong: — *All's Well that Ends Well* (1601-02); *Measure for Measure* (1603); *Troilus and Cressida* (1603); *Julius Cæsar* (1601); *Hamlet* (1602); *Othello* (1604); *King Lear* (1605); *Macbeth* (1606); *Antony and Cleopatra* (1607); *Coriolanus* (1608); and *Timon of Athens* (1607-08). The *fourth period* (1609 to 1613) is that in which Shakespeare, after having passed through a season which was probably darkened by his own personal experiences, suddenly attained the glad serenity of mind which enabled him to write his last romantic plays. To this period belong: — *Pericles* (1608), which is only partly from Shakespeare's hand; *Cymbeline* (1609); *The Winter's Tale* (1610-11); *The Tempest* (1610); with (the doubtful) *Two Noble Kinsmen* (1612) and *King Henry VIII* (1612-13), which are partly by another writer, supposed to be Fletcher. Of non-dramatic pieces Shakespeare was the author of *Venus and Adonis* (1593), *The Rape of Lucrece* (1594), the *Sonnets* and *A Lover's Complaint* (1609); while it is agreed that only a few of the poems in the collection published under the name of *The Passionate Pilgrim* (1599) were written by him. *The Phœnix and the Turtle*, with Shakespeare's name appended, was published as one of the poems in Chester's *Love's Martyr, or Rosalin's Complaint* (1601). The plays (of which there were eighteen, published singly in quarto form between the years 1597 and 1622) were mostly pirated, but a few were probably printed from the author's manuscripts. The first collected edition (the First Folio) was published in 1623, seven years after Shakespeare's death, by John Heminge and Henry Condell, who claim to be the 'friends and fellows' of the author. These editors depreciate the 'maimed and deformed' copies previously published, and declare that they are now offered 'cured and perfect,' while the eighteen plays not previously published are 'absolute in their numbers.' What is known as the Second Folio (1632) is a reprint of the former with conjectural emendations which are often misleading. The Third Folio (1664) contains seven additional plays, and the Fourth Folio (1685) was a reproduction of the third. The more important critical editions of Shakespeare's plays and complete works since published are as follows: — Nicholas Rowe, 7 vols. 8vo (1709); Alexander Pope, 7 vols. 4to (1723-25); Louis Theobald, 7 vols. 8vo (1733); Sir T. Hanmer, 6 vols. 4to (1743-44); Bishop Warburton, 8 vols, 8vo (1747); Samuel Johnson, 8 vols. 8vo (1765); E. Capell, 10 vols. 8vo (1767); Johnston and Steevens, 10 vols. 8vo (1773); E. Malone, first 'Variorum Edition,' 10 vols. 8vo (1790); Boswell, 'Variorum Edition,' 21 vols. 8vo (1821); S. W. Singer, 10 vols. 18mo (1826); C. Knight, 8 vols. 8vo (1838-43); J. P. Collier, 8 vols. 8vo (1841-44); J. O. Halliwell, 16 vols. folio (1853-65); N. Delius, 8 vols. 8vo (1854-65); A. Dyce, 6 vols. 8vo (1857); R. G. White (Boston), 12 vols. 8vo. (1857-60). Since then there have been innumerable editions in many languages. The contention that Bacon wrote the Shakespeare plays was first voiced in 1856 and has been revived from time to time, but the contention rests on slender basis and few scholars have been converted to the theory.

Shale (shāl), a term applied in geology to all argillaceous strata which possess to a greater or less degree the quality of splitting into layers parallel to the planes of deposition. It is the solidified mud of ancient waters, and is various in color and composition, the chief varieties being sandy, calcareous, purely argillaceous and carbonaceous. Shale is frequently found deposited between seams of coal, and commonly bears fossil impressions. The sub-variety

known as bituminous shale burns with flame, and yields an oil, mixed with paraffin, of great commercial importance. Shale also yields alum to a large extent.

Shaler (shā'ler), NATHANIEL SOUTHGATE, geologist, born in Campbell county, Kentucky, in 1841. He was graduated from Harvard College in 1862. He served in the Civil war, in 1868 became professor of paleontology in Harvard, and in 1887 professor of geology. He was also dean of the Lawrence Scientific School, and was director of the Kentucky geological survey, 1873-80. He published numerous works of a popular-science character, also seven volumes of geological reports and *Text Book of Geology*. Among his other works are *The Story of Our Continent*, *Domesticated Animals*, etc. He died April 10, 1906.

Shalloon (sha-lön'), a light woolen stuff said to derive its name from *Châlons* in France, where it was originally manufactured.

Shallop (shal'up). This name is usually applied to a large boat with two masts and rigged like a schooner.

Shallot (sha-lot'), a plant, the *Allium ascalonicum*, a species of onion, the mildest cultivated. It is sufficiently hardy to endure the severest winters. The shallot is used to season soups and made dishes, and makes a good addition in sauces, salads and pickles.

Shamanism (sham'an-izm), a general name applied to the religions of a number of the nomad peoples of Northern Asia. The Shaman is a wizard priest who performs sacrifices and works magical spells. The worshipers believe in a Supreme Being, but to this they add the belief that the government of the world is in the hands of a number of secondary gods both benevolent and malevolent towards man, and that it is absolutely necessary to avert their malign influence by magic rites and spells.

Shammai (sham'a-ī), a Jewish rabbi of whom little is known. See *Hillel*.

Shamokin (sha-mō'kin), a borough of Northumberland Co., Pennsylvania, 19 miles S. E. of Sunbury. It is in a rich anthracite coal region, and ships coal largely. It has also iron and powder works, and important manufactures of silks, knit-goods, shirts, stockings and bricks. Pop. 21,204.

Shamoy Leather (sham'oi) a soft leather prepared from the skins of goats, deer and sheep (originally the chamois, whence the name) by impregnating them with oil. This leather can be washed without losing its color, and is put to numerous uses.

Shampooing (sham-pö'ing), the name given in the East Indies to a process connected with bathing, in which the whole body is pressed and kneaded by the hands of the attendants. In this country it signifies manipulation of the scalp and hair.

Shamrock (sham'rok), the name commonly given to the national emblem of Ireland. It is a trefoil plant, generally supposed to be the plant called white clover (*Trifolium repens*), but some think it to be rather the wood-sorrel (*Oxālis Acetosella*). The plant sold in Dublin on St. Patrick's Day is the small yellow trefoil (*Trifolium minus*).

Shamyl (sham'il), a Caucasian chief, was born in the north of Daghestan in 1797; and died in 1871. He studied Arabian grammar and philosophy under the Mollah Jelal-eddin, and became a disciple of Kasi-Mollah, whose revival of Sufism had formed a bond of union among the tribes of Daghestan. In 1824 he joined Kasi-Mollah in the struggle which then broke out against the Russians. In this struggle he ultimately became the elected chief, and displayed unusual powers of leadership, continuing to resist the Russian power until 1859, when he was captured and taken to St. Petersburg. Here he was hospitably received by the czar, who provided him with a pension and a residence.

Shanghai, or SHANGHAE (shang-hī'), a large city and seaport of China, province of Kiangsoo, on the Woosung or Whangpoo, about 12 miles above its entrance into the estuary of the Yang-tsze-kiang. The Chinese city proper is inclosed within walls 24 feet high, the streets being narrow and dirty, and the buildings low, crowded, and for the most part unimportant. In 1843 Shanghai was opened as one of the five treaty ports, and an important foreign settlement is now established (with a separate government) outside the city walls. The Woosung here is about ¾ mile wide, and increases to over 1 mile at its outlet into the Yang-tsze, at the port of Woosung. Along the bank of the river extends a wide 'bund' or quay, with a bulwark of stone and numerous stone jetties, for landing and loading cargo. In the foreign settlement there are a fine cathedral, municipal offices, hospitals, club-house, etc. A municipal council is elected by the English and Americans, and another by the French, whose quarter is sepa-

rately administered. The subjects and citizens of each nationality are under the protection of their respective consuls, and a complete judicial staff has been established, forming at Shanghai a supreme court, with jurisdiction over all British subjects in China and Japan. The Chinese authorities retain complete control over all shipping dues, duties on imports and exports, etc. Shanghai has water communication with about a third of China, and its trade since the opening of the port has become very extensive, the total of exports and imports together, native and foreign, amounting to more than $200,000,000. The chief imports are cottons, yarns, woolens, and opium; and the exports, silk, tea, rice, and raw cotton. The largest part of the foreign trade is in the hands of British merchants. The foreign pop. is about 7000, and the native population is estimated at 650,000.

Shannon (shan'un), the largest river of Ireland, rises at the base of Cuilcagh Mountain in County Cavan; flows S. W. and S., dividing Connaught from Leinster and Munster; and enters the Atlantic by a wide estuary; length about 250 miles. This estuary begins a little below Limerick, and is navigable by large vessels, while small craft ply nearly the whole length of the river. It is connected with the Royal Canal and the Grand Canal, which give a direct communication to Dublin, and also a communication south into the basins of the Barrow and Suir.

Shanny (shan'i; *Pholis lævis*), a small sea-fish allied to the blenny, and found under stones and seaweeds, where it lurks. By means of its pectoral fins it is able to crawl upon land, and when the tide ebbs will often creep upon shore until it finds a crevice wherein it can hide until the tide returns.

Shansee (shän'sē'), an inland province of Northern China, with an area of about 55,000 sq. miles, is the original seat of the Chinese people, and in its lowland parts is well cultivated. The rivers, which are almost all tributaries of the Yellow River (Hoang-Ho), are numerous, but not large. The chief grain crops are wheat and millet, and there are coal, iron, copper, and other minerals. The capital is Tae-yuen-foo. Pop. about 12,200,000.

Shan States, a number of small semi-independent communities occupying a district N. of Siam and E. of Burmah, the boundary of which is not well defined. The area is estimated at about 70,000 sq. miles. Each state is governed by a chief and a council; the nominal religion is Buddhism, and the practice of slavery is general. The people (Shans) have attained much proficiency in various handicrafts, and show great aptitude for trade. Pop. over 1,000,000.

Shantung (shän'töng'), a maritime province of China, on the Yellow Sea; area, about 65,000 square miles. The greater portion of this province is level. The chief river is the Yellow River or Hoang-Ho, which, after traversing the province in a northeast direction, flows into the Gulf of Pe-cheli. Wheat, millet, indigo, and silk are the chief products, and the manufactures include silk and hempen cloths, felt, etc. There are rich deposits of coal and iron, and gold, lead, and other minerals are found. It was in this province that Confucius was born. The capital is Tse-nan-foo, and the population is estimated at about 37,500,000.

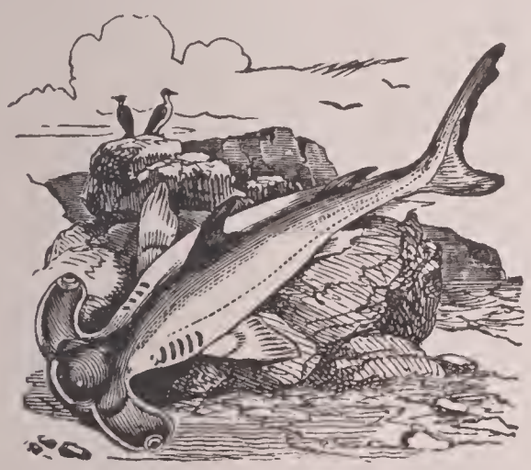
Shari (shä'rē), a large river in Central Africa, which enters the southern side of Lake Tchad by several mouths after a course of about 700 miles from the southeast. See *Tchad.*

Shark, the general name for a group of elasmobranchiate fishes, celebrated for the size and voracity of many of the species. The form of the body is elongated, and the tail thick and fleshy. The mouth is large, and armed with several rows of compressed, sharp-

White Shark (*Carcharias vulgaris*).

edged, and sometimes serrated teeth. The skin is usually very rough, covered with a multitude of little osseous tubercles or placoid scales. They are the most formidable and voracious of all fishes, pursue other marine animals, and seem to care little whether their prey be living or dead. They often follow vessels for the sake of picking up any offal which may be thrown overboard, and man himself often becomes a victim to their rapacity. The sharks formed the genus *Squalus* of Linnæus, which is now divided into several families, as the Carcharidæ, or white sharks; Lamnidæ, or basking sharks; Scymnidæ, including the Greenland shark; Scyllidæ, or dog-fishes, etc. The basking shark

(*Selache maxima*) is by far the largest species, sometimes attaining the length of 40 feet, but it has none of the ferocity of the others. The white shark (*Carcharias vulgāris*) is one of the most formidable and voracious of the species. It is rare on the northern coasts, but common in many of the warmer seas, reaching a length of over 30 feet. The hammer-headed sharks (*Zygæna*), which are chiefly found in tropical seas, are very voracious, and often attack man.



Hammer-headed Shark (*Zygæna malleus*).

They are noteworthy for the remarkable shape of their head, which resembles somewhat a double-headed hammer, the eyes being at the extremities. Other forms are the porbeagle, blue shark, fox shark, sea-fox, sea-ape or thresher, and Greenland or northern shark. The shark is oviparous or ovoviviparous, according to circumstances. See *Dog-fish*, *Porbeagle*, etc.

Sharon (shār'un), a borough of Mercer county, Pennsylvania, 41 miles S. W. of Meadville. Coal is largely mined in the vicinity, and there are large steel and iron works, foundries, machine shops and rolling mills, with other branches of iron-working industry; also saw, planing and flour mills. Pop. (1910) 15,270; (1920) 21,747.

Sharp, in music, the sign (♯) which, when placed on a line or space of the staff at the commencement of a movement, raises all the notes on that line or space or their octaves a semitone in pitch. When, in the course of the movement, it precedes a note, it has the same effect on it or its repetition, but only within the same bar.—*Double sharp*, a character (×) used in chromatic music, and which raises a note two semitones above its natural pitch.

Sharp, JAMES, a Scottish prelate, was born in the castle of Banff in 1613. He studied for the church at the University of Aberdeen, and was afterwards professor of philosophy at St. Andrew's. In 1660 he was sent by several leading Presbyterians on a mission to General Monk in favor of the Restoration, and the latter sent him to Breda to meet Charles II, after a conference with whom he went over to the Church of England. For this he was rewarded by being appointed professor of theology in St. Andrew's, and chaplain to the king of Scotland. In 1661 parliament met and established episcopacy, and he was shortly afterwards appointed archbishop of St. Andrew's. His persecutions of the Covenanters made him detested by that party, and in 1679 he was waylaid and murdered on Magus Moor, Fifeshire, by a party of his enemies headed by John Balfour of Burley.

Sharp, WILLIAM, a celebrated English line engraver, born at London in 1749; died in 1824. He first practiced as a writing engraver, but ultimately followed the higher branches of his art with great success. His merit was first recognized in connection with the engraving of Stothard's designs for the *Novelist's Magazine*, and his chief works of large size are from paintings by Copley, West, Reynolds, Raeburn, Stothard, Romney, Salvator Rosa, and Annibal Carracci.

Sharp, WILLIAM, a British writer, born in Renfrewshire in 1856. He was educated at Glasgow University, and published several volumes of poetry and biography, also *Wives in Exile*, *Silence Farm*, and other novels. He died Dec. 14, 1905, and after his death it became known that he had also written under the pen name of Fiona Macleod, supposed to be a separate writer. Under this name he wrote a number of novels, three volumes of Celtic tales, etc.

Sharpe, SAMUEL, a nephew of Rogers the poet, born in 1799; died in 1881. In addition to numerous biblical publications he was the author of a *History of Egypt*, *Chronology of Ancient Egypt*, and numerous works on hieroglyphics and Egyptian antiquities.

Sharpsburg (shärps'burg), a borough of Allegheny Co., Pennsylvania, on the Allegheny River, 5 miles N. E. of Pittsburgh. It has rolling mills, steel works, and manufactures of stoves, wire, paints, bricks, etc. There are petroleum and iron fields in its vicinity. Pop. 8921.

Shasta, MOUNT, a peak of volcanic origin in Siskiyou Co., California, at the north end of the Sierra

Nevada, 14,350 feet above sea-level. On its summit are three glaciers, one of which, the Whitney glacier, is 3 miles long. On its slopes are some gigantic trees over 300 feet high. The mountain is almost a perfect cone, and is a dormant volcano.

Shastra (shas'tra), or SHASTER, a law or book of laws among the Hindus; applied particularly to a book containing the authorized institutes of religion, and considered of divine origin. It is also used in a wider sense of treatises containing the laws or institutes of the various arts and sciences.

Shave-grass. See *Equisetum.*

Shaw (shạ), ALBERT, editor and author, was born at Shandon, Ohio, in 1857. He became a journalist, and in 1890 established the *American Review of Reviews*, which he has since edited. He is the author of numerous works, including *Icaria—a Chapter in the History of Communism*, *Coöperation in the Northwest*, *Municipal Government in Great Britain*, etc.

Shaw, ANNA HOWARD, an American suffragist, born at Newcastle-on-Tyne, England, February 14, 1847, came to America with her parents in 1851. She graduated from both the theological and medical departments of the University of Boston, and had several charges in the Methodist Church. In 1885 she resigned to become a lecturer on the suffrage platform, and in 1904 was chosen president of the National American Woman's Suffrage Association. Died July 2, 1919.

Shaw, GEORGE BERNARD (1856-), a British dramatist, novelist, essayist and critic, born in Dublin, Ireland, in which city he passed the first twenty years of his life, removing to London in 1876. He left school when he was fifteen, and this ended his formal education. A clerkship was obtained for him in a real-estate office, but he resigned this after a short time and set himself to make a name and a place for himself in the literary world of London. For ten years he struggled, meeting with scant recognition, but during these years he became interested in Socialism, and was one of the founders of the Fabian Society. His knowledge of art and music made it possible for him to undertake the task of art critic for the *Pall Mall Gazette* and musical critic for the *Star*. Later he was dramatic critic for the *Saturday Review*. His work began to attract attention, and his novels, *An Unsocial Socialist* and *Cashel Byron's Profession*, received favorable comment.

His first play, *Widowers' Houses*, was Socialist propaganda. It was produced in 1892. His second play, *Mrs. Warren's Profession*, was directed against the social evil and because of its unconventional frankness it was denounced as immoral. Shaw succeeded in shocking the British public, and throughout the rest of his life he rarely lost an opportunity to repeat the shocks, professing himself delighted when he heard himself described as a power for evil. Even during the great war he refused to allow himself to be caught up with the current thought, and his trouble-making proclivities found vent in a number of magazine articles wherein he attacked the government and hinted that England was not wholly guiltless so far as responsibility for the war was concerned. Shaw averred that he took great pleasure in laughing at society, and in time he was accepted as a humorist who was never quite serious even when he wrote or spoke about the most sacred things. His play, *Man and Superman*, is regarded as the clearest concrete expression of his philosophy of life. This play, like the many which he wrote, had a wide sale in book form. With its voluminous instruction to the players, its graphic description of the scenes, and its brilliant introductory pages, it is unique among published plays.

His plays, in addition to those mentioned, include: *Arms and the Man*, *Candida*, *You Never Can Tell*, *The Man of Destiny*, *The Devil's Disciple*, *Cæsar and Cleopatra*, *John Bull's Other Island*, *Fanny's First Play*, *Androcles and the Lion*. In 1916 he wrote *Augustus Does His Bit*, and in 1917 *Heartbreak House*. He has written various tracts on Socialism published by the Fabian Society, and is author of *Fabianism and the Empire* and *Fabianism and the Fiscal Question*.

Shaw, CHARLES GRAY (1871-), an American educator and author, born at Elizabeth, N. J., educated at Cornell and New York Universities and Drew Theological Seminary. He studied philosophy at Jena and Berlin and was appointed Professor of Philosophy at New York University in 1899. Among his published works are *Christianity and Modern Culture*, *The Precinct of Religion*, *Schools of Philosophy* (in 'Science History of the Universe'), *The Value and Dignity of Human Life*, and *The Ego and Its Place in the World*.

Shaw, HARRIETT MCCREARY (1865-), an American Artist, born at Fayetteville, Arkansas, educated at the University of Arkansas and Denver School of Arts, in which latter institution she became an instructor. She was director of exhibits at the Woman's Building at the Seattle Exposition in 1909 and lectured extensively on fine arts. She re-

ceived the silver medal for ivory miniatures at the St. Louis Exposition, gold and silver medals for life portraits at the Seattle Exposition, and many other medals.

Shaw, Henry Wheeler ('Josh Billings'), an American humorist, born at Lanesborough, Mass., in 1818. His humorous sketches, which he signed 'Josh Billings,' were written in a kind of phonetic spelling and attained wide popularity. For many years he was a contributor to the *New York Weekly*. He went on the lecture platform and met with instant success; his droll sayings and quaintness of utterance winning his audiences. He published *Every Boddy's Friend, Josh Billings' Complete Works, Josh Billings' Trump Kards*, and *Josh Billings' Spice Box*. He died at Monterey, Cal., in 1885.

Shaw, James Byrnie (1866-), an American educator and mathematical expert, born at Remington, Ind. He was on the faculty of various colleges in Illinois and Michigan. From 1903 to 1910 he was professor of mathematics at the James Milliken University, Decatur, Ill., assistant professor and later associate professor of mathematics at the University of Illinois. He was a member of several mathematical societies in America, France and England.

Shaw, John Balcolm (1860-), an American educator, author, and Presbyterian clergyman. He was born at Bellport, N. Y., and was graduated from Union Theological Seminary, New York, in 1888. He was pastor of the West End Church of New York from 1888 to 1904; of the Second Presbyterian Church, Chicago, from 1904 to 1913; and of Immanuel Church, Los Angeles, 1913-15. Subsequently he was president of Elmira College, New York. Author of *Four Great Questions, The Difficult Life, Life That Follows Life*, etc.

Shaw, Leslie Mortier (1848-), an American lawyer and cabinet officer, born at Morristown, Vt. He was graduated from Cornell College, Iowa, 1874, and practiced law in Denison, Iowa. Later he engaged in banking and became permanent chairman of the International Monetary Convention, Indianapolis. He was governor of Iowa for two terms, 1898-1902, and served as Secretary of the Treasury in the cabinet of President Roosevelt, 1902-07.

Shaw, Richard Norman (1831-1912), a Scottish artist and architect, born in Edinburgh and educated there. The New Scotland Yard, in London, is regarded as his finest achievement. He was a member of the Royal Academy.

Shawinigan Falls (shą'in-i-gan), a town of St. Maurice Co., Quebec, Canada, on St. Maurice River, 21 miles N. of Three Rivers. The Falls near the town are 165 feet high and can develop 200,000 horse power. The industries include aluminum paper and pulp, manganese and carbide, electric light and power, etc. Pop. (1911) 4265; (1921) 10,625.

Shawl (shąl), an article of dress usually of a square or oblong shape, worn by both sexes in the East, but in the West chiefly by women. Some of the Eastern shawls, as those of Cashmere, are beautiful and costly fabrics. The usual materials in the manufacture of shawls are silk, cotton, hair or wool. Norwich and Paisley were long famed for their shawls made in imitation of those from India.

Shawnee, a city of Pottawatomie Co., Oklahoma, 30 miles E. S. E. of Oklahoma City. Its industries include cotton-gins, compresses, oil mills, machine shops, etc. Pop. (1920) 15,348.

Shays' Rebellion, an uprising in western Massachusetts, 1786-87, under the leadership of Daniel Shays (1747-1825), of Pelham, who had been an officer in the war of the Revolution. It was due to the poverty and exhaustion of the country after the war and discontent with the taxes. The sitting of the courts was prevented at Northampton, Worcester and elsewhere; and a session of the Supreme Court at Springfield was broken up. An attempt was made to seize the Federal arsenal at Springfield on January 25, 1787, but Shays' forces were routed by General Benjamin Lincoln with about 4000 militia. Soon after, the rebellion collapsed. Some of the leaders were sentenced to death, but were subsequently pardoned by Governor Hancock.

Shea (shē'a), the *Bassia butyracea* of botanists, is a native of tropical Asia and Africa. The trunk of this tree, when pierced, yields a copious milky juice, and *shea* or vegetable butter is found in the nuts when crushed. The latter are the size of a pigeon's egg, and each tree yields about a bushel. See *Bassia*.

Sheading (shē'ding), in the Isle of Man, a riding, tithing, or division in which there is a corner or chief constable. The isle is divided into six sheadings.

Shears (shērz), a kind of large scissors, consisting of two movable blades with bevel edges for cutting cloth, etc. Sometimes, as in the shears used by furriers, weavers, etc., they are made of

a single piece of steel bent round until the blades meet.

Shearwater, the name of several marine birds of the genus *Puffinus*. The great shear-water (*P. cinereus*), which is 18 inches long, is found on the southwest coasts of England and Wales. They fly rapidly, skimming over the sea, from which they pick up small fishes, molluscs, etc. The name is sometimes applied to the scissor-bill or skimmer (*Rhynchops nigra*).

Sheat-fish, a name given to the fishes of the family Siluridæ, of which the best-known species is the sly silurus or sheat-fish (*Silūrus glanis*), found in the Swiss lakes, and in Eastern European rivers. See *Silurus*.

Sheath (shēth), in botany, a term applied to a petiole when it embraces the branch from which it springs, as in grasses; or to a rudimentary leaf which wraps round the stem on which it grows.

Sheath-bill (*Chiŏnis alba*), a bird belonging to the order Grallæ. They derive their name from the horny sheath which overlies the nostrils, and is continued back until it extends in a kind of hood, thickly feathered, covering the face. In appearance and flight they are not unlike pigeons, their plumage being dazzlingly white. They inhabit the islands of the southern oceans, more especially Kerguelen's Island and the Crozets.

Sheathing, in naval architecture, is an external covering applied to the bottoms of wooden vessels to protect them from barnacles and other animal or vegetable parasites. Copper was for a long time the material frequently used, but various other metals have been recently tried, among the most successful being Muntz's metal.

Sheave (shēv), a grooved wheel in a block or pulley upon which the rope or chain works.

Sheba (shē'ba), anciently a region in the south of Arabia, whose queen paid a celebrated visit to Solomon.

Sheboygan (shē-boi'gan), a city of Wisconsin, capital of a county of the same name, is situated on the west shore of Lake Michigan, at the mouth of the Sheboygan river. It has a good harbor and a trade in wheat and lumber. Fish are caught and exported in large quantities. Manufactures are varied and extensive, chair making being the most important. There are also large tanneries and manufactures of furniture, wagons, auto trucks, shoes, woodenware, and enamel products. Pop. (1900) 22,962; (1910) 26,398; (1920) 30,955.

Shechem (shē'kem), an ancient city of Palestine, situated on the watershed between the Mediterranean and the Jordan, about 30 miles north of Jerusalem, and midway between Galilee and Judæa. In the New Testament narrative it has been identified with Sychar, and is now represented by Nablus. See *Nablus*.

Shechinah (she-kī'na), a term used by the Jews to indicate the cloud or visible representative of the divine presence between the cherubim of the mercy-seat of the tabernacle and afterwards of the temple of Solomon.

Sheep, a ruminant animal of the genus *Ovis*, family Capridæ, and nearly allied to the goat. It is one of the most useful animals to man, as its wool serves him for clothing, its skin is made into leather, its flesh is an excellent article of food, and its milk, which is thicker than that of cows, is used in some countries to make butter and cheese. The varieties of the domestic sheep (*Ovis aries*) are numerous, but it is not known from what wild species they were originally bred, although it is probable that the smaller short-tailed breeds with crescent-shaped horns are descended from the wild species known as the moufflon. The ordinary life of a sheep is from twelve to fifteen years; but it is usually fattened and sent to market at the age of two or three years unless its fleece be the object desired. The latter is shorn every year about the month of May. The chief English varieties of the sheep are the large Leicester, the Cotswold, the Southdown, the Cheviot, and the black-faced breeds. The Leicester comes early to maturity, attains a great size, although the mutton is not of the finest quality, and its fleece weighs from 7 to 8 lbs. The Cotswold breed, which has been improved by crossing with the Leicesters, has fine wool, and a fine grained mutton. The Southdowns are large, their wool is short, close, and curled, and the mutton is highly valued. The Cheviot is a hardier breed than any of the preceding; its wool is short, thick, and fine, while its mutton is of excellent quality. The black-faced breed is the hardiest of all, its wool is long and coarse, and its mutton is considered the finest. The Merino variety of sheep originally belonged to Spain (where in summer they feed upon the elevated districts of Navarre, Biscay, and Aragon, and winter in the plains of Andalusia, New Castile and Estremadura), but they are now reared in other parts of the continent, as also in Australia and New Zealand. In the United States nearly all the sheep

are of Merino origin, though the breeds have not been kept pure. Their wool is long and fine, but the mutton is of minor value. Of other breeds, which are numerous, mention may be made of the broad-tailed or fat-tailed sheep (*Ovis laticauda*), common in Asia and Egypt, and remarkable for its large tail, which is loaded with fat; the Iceland variety, which has sometimes three, four, or five horns; the fat-rumped sheep of Tartary; the Astrakhan or Bucharian sheep, the wool of which is twisted in spiral curls of a fine quality; the Wallachian or Cretan sheep, which has long, large, spiral horns; and the Rocky Mountain sheep, a wild species, native to North America, and notable for its large horns. See *Argali, Bighorn, Moufflon.*

Sheep Bot-fly. See *Bot-fly.*

Sheep-laurel, a small North American shrub of the genus *Kalmia* (*K. angustifolia*). It is a favorite garden shrub, and receives its name from its leaves and shoots being hurtful to cattle. Called also *Lambkill.*

Sheepshanks, John, art patron, born at Leeds, England, in 1787; died in 1863. In 1856 he presented his fine collection of paintings, etc., to the nation, and they are now in the South Kensington Museum. They comprise 233 oil-paintings and 103 sketches and drawings by the most eminent British artists of his time.

Sheep's-head, the name of a fish (*Sparus ovis*) caught on the shores of Connecticut and Long Island and southward as far as Florida. It is allied to the gilt-head and the bream, and is considered a delicious food. It receives its name from the resemblance of its head to that of a sheep.

Sheep-tick, a well-known dipterous insect (*Melophăgus ovīnus*) belonging to the family Hippoboscidæ or horse-flies. The pupæ produced from the eggs are shining oval bodies which become attached to the wool of the sheep. From these issue the tick, which is horny, bristly, of a rusty ochre-color, and wingless. It fixes its head in the skin of the sheep, and extracts the blood, leaving a large round tumor. Called also *sheep-louse.*

Sheeraz. See *Shiraz.*

Sheerness (shēr-nes'), a seaport, dockyard, and garrison town of England, county of Kent, in the Isle of Sheppey, on the river Medway, at its junction with the Thames, 47 miles east of London by rail. The harbor is safe and commodious, and the fortifications, which are modern, are of immense strength. The admiralty dockyard employs a large number of men, and is principally utilized for repairs. Sheerness has large military and naval barrack accommodation. It has now become a favorite summer resort, as it has a fine beach and excellent facilities for bathing, etc. Pop. 17,494.

Sheers (shērs), a kind of apparatus for hoisting heavy weights, consisting of two or more poles erected in a mutually inclined position, and fastened together at the top, their lower ends being separated to form an extended base. The poles are steadied by guys, and from the top depends the necessary tackle for hoisting. Permanent sheers, worked by steam, are now used at loading wharfs in dockyards.

Sheffield (shef'fēld), a city of Colbert Co., Alabama, on Tennessee River, in a coal and iron mining region, with oil mills, etc. Pop. 6682.

Sheffield (shef'fēld), a borough of England, county of York (West Riding), situated on hilly ground at the junction of the Sheaf and Don, about 160 miles north of London by rail. The site of the town was originally confined to the angle formed by the Sheaf and Don, but it now extends along the slopes above these rivers and their tributaries, the Loxley, Rivelin, and Porter. In the central parts great improvements have recently been made in the crowded streets by the corporation, and the suburban districts are well built and picturesquely situated. The chief ecclesiastical building is the ancient parish church of St. Peter's in the Perpendicular style, and recently restored. Of educational and literary institutions there are the Free Grammar School, the Church of England Educational Institute, the University College, the Wesley College, Ranmoor College, the School of Art, the Free Library, and the St. George's Museum founded by Mr. Ruskin. Other important buildings are the Town Hall, the Cutlers' Hall, the Corn Exchange, the Music Hall, and the Albert Hall. There are numerous hospitals and charitable institutions. The town is well supplied with parks, chief of these being the Norfolk, Firth, and Weston parks, the latter of which includes a museum and the Mappin Art Gallery. There is a fine botanical garden. The trade of Sheffield is chiefly connected with cutlery, for which it has long been famous, and the manufacture of all forms of steel, iron, and brass work. The steel manufacture includes armor plating, rails, engine castings, rifles, etc. There are also manu-

factures of engines, machinery, plated goods, Britannia-metal goods, optical instruments, stoves and grates, etc. Sheffield is supposed to have been originally a Roman station. Edward I granted it a charter as a market town in 1296, and there is indication in Chaucer's writings that the town was then noted for its cutlery. But it is only since the beginning of the last century that it has developed such importance as a manufacturing center. The chief modern event in its history was a terrible disaster in 1864, occasioned by the bursting of Bradfield Reservoir. Pop. (1911) 454,653.

Sheik (shēk or shāk), a title of dignity properly belonging to the chiefs of the Arabic tribes, but now largely used among Moslems as a title of respect. The head of the Mohammedan monasteries, and the head man of a village, are sometimes called sheiks. The chief mufti at Constantinople is the Sheik-ul-Islam.

Sheil (shēl), RICHARD LALOR, an Irish political orator, born at Drumdowney, Tipperary, in 1791; died in 1851. He was educated at Stoneyhurst and at Trinity College, Dublin, and became a member of the Irish bar in 1814. Soon afterwards he produced a number of plays and wrote a series of papers called *Sketches of the Irish Bar.* Along with O'Connell he agitated for Catholic emancipation, and in 1831 he entered parliament as member for Louth, where he soon established his reputation as an orator. He was successively appointed vice-president of the board of trade (1839), judge advocate-general (1841), master of the mint (1846), and minister at Florence (1850).

Shek'el, a Jewish weight and in later times a coin. The weight is believed to have been about 218 or 220 grains troy, and the value of the silver coin 60 cents. There were also half-shekels coined both of silver and copper. A shekel (weight) of gold was worth $9.10. The shekel of the sanctuary is supposed to have been originally worth double the common shekel.

Shelby (shel'bi), a city of Richland Co., Ohio, 12 miles N. W. of Mansfield. It is in the center of a grain-growing district and has a number of manufactures, including tractors, metal products, wire, furniture, etc. Pop. (1920) 5578.

Shelbyville (shel-bi-vil), city and the county seat of Shelby Co., Indiana, on the Blue River, 26 miles S. E. of Indianapolis. The industries are furniture manufacture, flour, brick, lumber, etc. The principal buildings include a Carnegie Library, the City Hospital, Hord Sanitarium, court house, city hall and high school building. Pop. (1920) 9701.

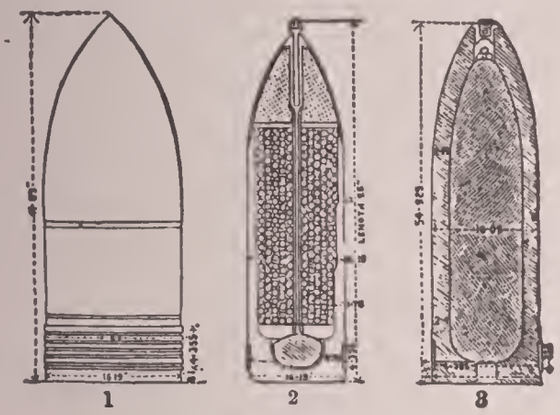
Sheldrake (shel'drāk), or SHELDRAKE, the name given to two species of British ducks, namely, the common sheldrake (*Tadorna vulpanser* or *Anas tadorna*) and the ruddy sheldrake (*Casarca rutila*). They are sometimes called burrow-ducks, from their habit of making their nests in rabbit-burrows.

Shell, the name applied to the external limy covering secreted by various groups of invertebrate animals, but restricted in a scientific sense to that form of exoskeleton secreted by the mantle of the mollusca. Thus the hard coverings of crabs, sea-urchins, lobsters, foraminifera, etc., are scientifically known as 'tests,' and are not to be regarded as true shells. The shell in mollusca grows with the growth of the animal, to which it affords protection. The shell or test of a crustacean does not grow after it has once been formed, but is cast and renewed from time to time. In its most elementary form the molluscan shell exists as simply a covering to the gills. Each separate piece is termed a valve. When the shell consists of one piece, as in whelks, limpets, etc., it is called a *univalve;* when in two pieces, as in oysters, mussels, etc., it is called a *bivalve;* and in the Chiton family of gasteropoda it is called, because of its eight pieces, a *multivalve.* In their chemical composition shells are usually composed of carbonate of lime, mixed with a small proportion of organic matter. (See *Mollusca.*) Shells are much used in ornamental manufactures. See *Camco, Mother-of-pearl.*

Shell, a hollow projectile filled with a bursting charge of gunpowder or other explosive composition, and fitted with a fuse to fire it at the desired point Shells are usually made of cast-iron or steel, and for mortars or smooth-bore cannon are spherical, but for rifled guns are as a rule elongated. There are many kinds of shells.— *Common shells* are simple hollow projectiles filled with powder. On explosion they act like a mine. They are very effective in breaching earthworks or masonry.— *Palliser shells* are made of mottled iron with pointed heads, nearly solid, and chilled white by being cast in iron molds. They are intended for use against armor-clad vessels; the chilled point, in virtue of its intense hardness and great crushing strength, penetrates to an extraordinary depth. *Steel* shells of similar power have also been made.— *Shrapnel shells* are shells filled with bullets, and with a small burst-

SPECIMENS OF INDIAN POTTERY

ing charge just sufficient to split the shell open and release the bullets at any given point.— *Segment shells* are of the nature of shrapnel. They contain iron segments built up round the inside of the shell. From their construction they are inclined



Shells.

1, Armor-piercing Steel Shell for 111-ton Gun. 2, Shrapnel for 111-ton Gun. 3, Common Shell for 111-ton Gun.

to spread much more than shrapnel on bursting, and they should consequently be fired to burst close to the object. With percussion fuzes great results are produced.

Shelley (shel'i), MARY WOLLSTONECRAFT, the second wife of the poet Shelley, was the daughter of William Godwin and Mary Wollstonecraft, and was born at London in 1797; died in 1851. She married Shelley in 1816, after having lived with him two years previously to the death of his first wife. Her romance of *Frankenstein*, which excited an immense sensation, was published in 1818, when she was twenty-one years' old. Left by her husband's death, in 1822, with two young children to support, she devoted herself for many years to literary composition, producing *Valperga*, *The Last Man*, and other works. In 1840-41 she edited Shelley's works, with preface and biographical notes.

Shelley, PERCY BYSSHE, born at Field Place, Horsham, Sussex, August 4, 1792, was the son of Sir Timothy Shelley, a landed proprietor of ancient family, and was educated at Sion House School, Brentford, at Eton, and at University College, Oxford. Of a delicate constitution, he was early characterized by an extreme sensibility and a lively imagination, and by a resolute resistance to authority, custom, and every form of what he considered tyranny. At Eton he put himself in opposition to the constituted authorities by refusing to submit to fagging. At Oxford, in his second year at the university, he published anonymously, apparently as a challenge to the heads of the colleges, to whom it was sent, a scholastic thesis entitled *A Defense of Atheism*. The authorship being known, he was challenged, and refusing either to acknowledge or deny it was at once expelled. After leaving the university he completed his poem of *Queen Mab*, begun some time previously, and privately printed in 1813. His first great poem, *Alastor, or the Spirit of Solitude*, saw the light in 1816; and this was followed, in 1817, by the *Revolt of Islam*, a poem in the Spenserian stanza. In Sept. 1811, six months after his expulsion, he eloped to Edinburgh with Harriet Westbrook, the daughter of a retired innkeeper. She was sixteen years of age, his own age being nineteen. The marriage turned out unhappily, and after nearly three years of a wandering, unsettled life Mrs. Shelley returned with two children to her father's house. In Nov., 1816, she committed suicide by drowning. Shelley was deeply affected by this event, but soon after married Mary Godwin, with whom he had visited the continent in 1814, and by whom he already had a child. By a suit in chancery decided in 1817, Mr. Westbrook obtained the guardianship of the children, on the plea that his atheistical opinions and irregular views on marriage made the father unfit to be intrusted with them. Partly from his lungs being affected, and partly from anxiety lest he should be deprived of the children of his second marriage, Shelley left England finally in March, 1818, and the whole short remainder of his life was passed in Italy. After staying for some time with Lord Byron at Venice he proceeded to Naples; after Naples he visited Rome; and from Rome he went to Florence and Leghorn, and finally settled at Pisa. On July 8, 1821, he was sailing with a Mr. Williams in the Bay of Spezia when both were drowned by, as was long believed, the upsetting of the boat through a sudden squall; but there is some warrant for suspicion that the boat was purposely run down by an Italian felucca for the sake of plunder. According to the quarantine laws of Tuscany the bodies were burned, and the ashes of Shelley were deposited by his friends in the Protestant burying-ground of Rome. Apart from special causes of alienation, Shelley's poetry would never have been popular with the mass of readers, even although in strength of imagination and fertility of fancy, particularly in the power of impersonation, as well as in command of language and appreciation of the beautiful in poetic art, he has had few rivals. The most popular of his works are his minor poems, which ap-

peared from time to time along with his larger pieces, particularly the *Cloud* and the *Skylark*. His principal poems, besides those already mentioned, are *Rosalind and Helen* and *Julian and Maddalo* (the latter a poem recording some of his intercourse with Byron), produced in 1818; the *Cenci* and the *Prometheus Unbound*, in 1819; the *Witch of Atlas*, in 1820; and the *Epipsychidion*, the *Adonais* (an elegy on Keats), and the *Hellas*.

Shell-lac, or SHELLAC. See *Lac.*

Shelton, a city of Fairfield Co., Conn., on Housatonic River, 8 miles w. of New Haven. Pop. 9475.

Shem, the eldest son of Noah, and ancestor of Abraham, who was the eighth in descent from him according to the genealogies in the book of Genesis.

Shemakha (she'mȧ-kȧ), a town of Russia, in Transcaucasia, about 70 miles northwest of Baku. In recent times it has suffered severely from earthquakes. Silk manufacture is the principal industry. Pop. 20,008.

Shemitic Languages. See *Semitic Languages.*

Shenandoah (shen-an-dō'ȧ), a borough of Schuylkill county, Pennsylvania, 12 miles N. of Pottsville. It is in one of the most productive anthracite coal regions, and has large collieries, dynamite works, etc. Pop. (1920) 24,726.

Shenandoah, a city of Page Co., Iowa, 40 miles S. by E. of Council Bluffs. It has extensive nurseries, flour mills, machine shops, powder factories, car shops, brick and tile works, etc. Pop. (1920) 5255.

Shenandoah, a river which flows northeast through the valley of Virginia, and immediately below Harper's Ferry joins the Potomac, of which it is the principal tributary. Its length is 170 miles, the greater part of which is navigable for boats. The valley of the Shenandoah was the scene of numerous military operations in the American Civil war, and was devastated by General Sheridan in 1864.

Shen-se (shen'sē), a province of China, bounded on the north by the Great Wall, and on the east by the Yellow River; area, about 70,000 sq. miles. It is purely an agricultural province. From Se-gan Foo, the provincial capital, and anciently the capital of the empire, radiate a number of roads going east, south, and west, and Shen-se is the great channel of communication between China and Central Asia. Pop. about 9,000,000

Shenstone (shen'stōn), WILLIAM an English poet, was born at Leasowes, in the parish of Halesowen, Worcestershire, in 1714, studied at Pembroke College, Oxford, and passed his life in retirement on his small paternal estate of Leasowes, beautifying it, and writing odes, elegies, ballads, and pastorals, which had considerable popularity. He now holds his place in literature chiefly by his *Pastoral Ballads* and his *Schoolmistress*, in the Spenserian stanza, published in 1742. He died in 1763.

Sheol (shē'ōl), a Hebrew word frequently occurring in the Old Testament, and rendered in the Septuagint by 'hades,' in the Authorized Version by 'grave,' 'pit,' and 'hell,' but in the Revised Bible of 1885 never, except in one instance, by the last term. It was, as originally conceived, the gloomy under-world, the abode of the ghosts or spirits of the dead. No retributive idea was connected with it until the time of the exile. See *Hell.*

Shepherd Kings. (shep'erd). See *Hycsos.*

Shepherd's Dog, a variety of dog employed by shepherds to assist in tending the flocks, remarkable for its intelligence and usefulness. It is generally of large size, and of powerful, lithe build. The tail is inclined to be long, and possesses a bushy fringe. The muzzle is notably sharp. The eyes are large and bright. The limbs are strongly made, and the whole frame betokens an adaptation to an open, outdoor life. Of all strains of shepherd's dog the Scotch collie or colley is the most celebrated. See *Collie.*

Shepherd's Purse (*Capsella bursa pastōris*), a plant of the nat. order Cruciferæ. It is an annual weed, found in all temperate climates, having simple or cut leaves and small white flowers. It is found everywhere, in fields, pastures and roadsides.

Sheppey (shep'pi), an island of England, in the county of Kent, at the mouth of the Thames, between the estuaries of the Medway and the Swale. It is 9 miles long and 5 broad, is rich and fertile, and contains the town of Sheerness.

Shepton-Mallet (shep'tun mal'et), a town of England, in Somersetshire, 4½ miles east of Wells. It has a remarkably handsome market-cross, erected about 300 years ago, and a church with a fine tower 120 feet high. The manufactures comprise silk, velvet, crape, ribbons, etc., but brewing is now the principal industry. Pop. 5011.

Sheraton, a style of furniture, designed by Thomas Sheraton (1751-1806), next to Chippendale the most famous English cabinet-maker. Some of his earlier designs are full of grace and delicacy, but the later ones are spoiled by too elaborate ornament. He borrowed and adapted extensively, but the slender forms and swan-necked pediments were his own invention, and the delicate inlay, the occasional slight carving in low relief and the painted enrichments gave his work a delicate and appealing beauty.

Sherborne (sher'burn), a town of England, in Dorsetshire, 18 miles N. N. W. from Dorchester. It is a place of great antiquity, having been the seat of a bishopric from 705 till 1078. The church of the ancient abbey, founded in 998, is one of the finest minsters in the south and west of England. There are here also ruins of a castle, dating from the time of Stephen. Pop. (1921) 6394.

Sherbrooke, (sher'brök), a city and port of Canada, county seat of Sherbrooke Co., at the junction of the Magog and St. Francis rivers, on the Canadian Pacific, Boston & Maine, and other railroads, 100 miles E. of Montreal. Its numerous industries include clothing, woolen and cotton mills, silk gloves, hosiery and underwear, boots, rubber goods, jewelry, tools, paper, machinery, etc. The neighborhood supplies asbestos, copper, lumber, and pulp. Pop. (1911) 16,405; (1921) 23,515.

Sherbrooke, ROBERT LOWE, VISCOUNT, an English statesman born in Nottinghamshire, Dec. 4, 1811; died July 27, 1892. He went to Australia in 1842, amassed a fortune and returned to England in 1850, entering parliament in 1852. He was chancellor of the exchequer 1868-73 in Gladstone's cabinet, home secretary in 1873, going out of office with his party in 1874. He was raised to the peerage in 1880.

Sherbrooke ROBERT LOWE, VISCOUNT, was born at Bingham in 1811, and educated at Winchester and Oxford. In 1842 he was called to the bar, and the same year emigrated to Australia. He returned to England in 1851, and in 1852 was elected to Parliament. He was chancellor of the exchequer 1868-73, in 1873 succeeded Mr. Bruce at the Home Office, and in 1874, went out of office with his party. On the return of the Liberals in 1880, he was raised to the peerage with the title of Viscount Sherbrooke. His *Poems* appeared in 1885. He died July 27, 1892.

Shere Ali Khan (shēr a'lē kän), Amir of Afghanistan, was born about 1823, and succeeded his father, Dost Mohammed, in 1863. During the earlier part of his reign he passed through many vicissitudes, but in 1868 he was fully established on the throne of Kabul. Because of his over-friendly relations with Russia, Britain invaded the country and Shere Ali fled. He died an exile in 1879.

Sheridan (sher'i-dan), PHILIP HENRY, the greatest cavalry leader produced by the American Civil War, was born in Albany, New York, March 6, 1831, was graduated from the Military Academy, West Point, in 1853, and from 1855 to 1861 served on the frontiers of Texas and Oregon. At the outbreak of the Civil War he was a captain in the 13th Infantry. Having greatly distinguished himself in the earlier battles of the war, in April, 1864, Grant appointed him chief of cavalry of the Army of the Potomac, and he made several daring cavalry raids towards Richmond. In August he took command in the Shenandoah Valley, where General Early was present with a Confederate army. Several battles took place between them, the most striking being that in which he rode from Winchester to Cedar Creek, a distance of 20 miles, and turned a Federal defeat into a brilliant victory. This feat is known as 'Sheridan's Ride.' During the final advance upon Richmond he was Grant's right-hand man; he fought the battle of Five Forks, which necessitated Lee's evacuation of Richmond and Petersburg; and as Lee fled he constantly harassed and attacked him, and by occupying his line of retreat compelled his surrender at Appomattox Court House, April 9, 1865. After the war he held various military commands. In March, 1869, he was raised to the rank of lieutenant-general, and in February, 1883, on the retirement of Sherman, he succeeded to the command of the army and on June 1, 1888, while suffering from a fatal illness, he was given the supreme rank of general. He died August 5, 1888. An account of his military career, written by himself, appeared in 1889.

Sheridan, RICHARD BRINSLEY BUTLER, was born at Dublin, Ireland, in 1751, his father being Thomas Sheridan. (See *Sheridan, Thomas.*) He was sent for a short time to a school in Dublin, and in 1762 to Harrow, where he did not distinguish himself. In 1772 he eloped to France with Miss Linley, a young singer of great beauty and accomplishments. Shortly before his marriage he had entered at the Middle Temple, but his studies were prosecuted with little assiduity, and he was never called to the

bar. Without means or a profession, he applied himself to composition for the stage, and on January 17, 1775, brought out *The Rivals*, which, after a temporary failure from bad acting, attained a brilliant success. On Nov. 21 he produced the comic opera, *The Duenna*, which had a run of seventy-five nights, an unprecedented success. In 1776 he managed to find money to become one of the proprietors of Drury Lane Theater, where, in 1777, appeared *The School for Scandal*, his most famous comedy, and in 1779 *The Critic*, a farce, which like *The Duenna* and *The School for Scandal* was a model of its kind, and shared in their brilliant success. His dramatic reputation, and especially his social gifts, brought him into intimacy with Fox, Burke, Windham, and other Whig leaders, and in 1780 Fox got him returned to parliament for Stafford. In 1782 he became under-secretary of state; in 1783 secretary of the treasury; in 1806 treasurer of the navy and privy-councilor. He never became a statesman, but his fame soon rose high as an orator. His greatest effort was his 'Begum' speech on the impeachment of Warren Hastings (1787), which Pitt said 'surpassed all the eloquence of ancient and modern times.' His wife died in 1792. In 1795 he married Miss Ogle, a daughter of the Dean of Winchester, with whom he received a considerable accession of means. He was on terms of intimacy with the Prince of Wales (afterwards George IV), which did not improve his naturally dissolute and extravagant habits. His parliamentary career ended in 1812, and the remainder of his life was constantly harassed by debt and disappointment. He died in 1816, having narrowly escaped arrest for debt on his death-bed. Sheridan's plays are especially distinguished for their wit, which, though brilliant, is easy and natural. In plot and character there is little originality, but admirable selection. His wit was polished and refined, and what he borrowed was at least brilliantly set.

Sheridan, a city, capital of Sheridan Co., Wyoming, 30 miles from the Montana State line; surrounded by rich coal and agricultural and cattle-raising country; with iron works, etc. Pop. (1920) 9175.

Sheridan, THOMAS, grandfather of R. B. Sheridan, was born in 1684; died in 1738. He was a close friend and confidant of Swift, and was noted for his learning and eccentricities. He wrote the *Art of Punning*, and published an edition of Persius.—His son, THOMAS, father of the dramatist, born 1721; died 1788, was educated at Westminster School and Trinity College, Dublin. He became an actor and teacher of elocution, and published a *Plan of Education*, *Life of Swift*, and a *Dictionary of the English Language*.— His wife, FRANCES CHAMBERLAINE (1724-66), was the author of two novels, *Sidney Biddulph* and *Nourjahad;* and two plays, *The Discovery* and *The Dupe*.

Sherif (she-rēf'), an Arabic title equivalent to noble, borne by the descendants of Mohammed. It descends both in the male and female line. Those who possess this rank are distinguished by green turbans and veils, green being the color of the Prophet. The title is applied specifically to the chief magistrate of Mecca.

Sheriff (sher'if), in England, the chief officer of the crown in every county, appointed annually. The office is one of great antiquity, and originally conferred higher powers than at present. The custody of the county is committed to the sheriff by letters-patent, and he has charge of all the business of the crown therein. During his tenure of office he takes precedence within the county of any nobleman, and is entitled to sit on the bench with the justices of assize. The person appointed is bound under a penalty to accept the office, except in specified cases of exemption or disability, but a person who has served one year is not liable to serve again till after an interval of three years if there be another sufficient person in the county. The sheriff is specially intrusted with the execution of the laws and the preservation of the peace, and for this purpose he has at his disposal the whole civil force of the county — in old legal phraseology, the *posse comitatus*. The most ordinary of his functions, such as the execution of writs, he performs by a deputy called under-sheriff, while he himself only performs in person those duties which are either purely honorary, such as attendance upon the judges on circuit, or which are of some dignity and public importance, such as presiding over elections and holding county meetings, which he may call at any time. Since the time of Henry I the Liverymen of London have, on Midsummer Day, elected two sheriffs, who have been jointly sheriff of Middlesex, but by the Local Government Act of 1888 it is provided that while the city of London may continue a separate county, with its own sheriffs, these shall no longer be jointly sheriff of Middlesex, and that the county of London shall have a sheriff of its own. The office of sheriff was formerly hereditary in some counties, and continued so in Westmoreland

till the death of the last hereditary sheriff, the Earl of Thanet, in 1849. In the United States the sheriff is an elective official, with very different position and duties. He does not hold the position of a judge at all, but acts as the highest peace officer of his county, having to pursue and arrest criminals, to carry out sentences, to take charge of the jail, etc.

Sherlock (sher'lok), THOMAS, Bishop of London, the son of Dr. Wm. Sherlock, dean of St. Paul's, was born in London in 1678, was educated at Catharine Hall, Cambridge, and succeeded his father as master of the Temple in 1704. In 1728 he was appointed to the see of Bangor; in 1734 he was translated to the see of Salisbury; and in 1748 (having refused the primacy) to the see of London, where he remained till his death in 1761. He was the author of several controversial works on Christian evidences, including *The Use and Intent of Prophecy* (1725), *The Trial of the Witnesses of the Resurrection of Jesus* (1729), and published four volumes of his discourses at the Temple Church (1754-58), which gained him a high reputation as a pulpit orator.

Sherlock, WILLIAM, an English prelate (1641-1707), born in Southwark. He became Dean of St. Paul's in 1691.

Sherman (sher'man), a city, county seat of Grayson Co., Texas, in the Red River Valley, 64 miles N. of Dallas, on the Houston & Texas Central, the Missouri, Kansas & Texas, and other railroads. It is in a fertile agricultural section, producing wheat, corn, cotton, oats, hay, and peanuts. There are 35 factories, the output including flour (four mills), grain, cotton, candy, machinery, brooms, soap, cottonseed oil, etc. Sherman has developed as a jobbing center. Its educational facilities include Austin College (Presbyterian co-educational), Kidd-Key College, for girls (Methodist), Carr-Burdette Christian College, for girls; St. Joseph's Catholic Academy, etc. The council-commissioner-manager form of government was adopted in 1915. Pop. (1910) 12,412; (1920) 15,031.

Sherman, JAMES SCHOOLCRAFT, Vice-President of United States, was born in Utica, New York, October 24, 1855. He was admitted to the bar in 1880, and became prominent in politics, being made mayor of Utica and elected to Congress in 1887. Here he became an active advocate of Republican measures, gained a leading position in his party, and in 1908 was elected on the William H. Taft ticket for the office of Vice-President. He was renominated in 1912, but died October 30, before the election.

Sherman, JOHN, statesman, born in Lancaster, Ohio, in May, 1823; admitted to the bar in 1844. In 1855 he was elected to Congress. As a ready and forcible speaker he was an acknowledged power from the first. He grew rapidly in reputation as a debater, and in 1861 was elected United States Senator. He rendered valuable services in strengthening the public credit, and in 1866 was one of the authors of the bill for the reconstruction of the seceded States. He was appointed Secretary of the Treasury in 1877, and secured the resumption of specie payment. In 1881 he was again Senator and remained in the Senate until 1897, when he entered McKinley's cabinet as Secretary of State. He retired in 1898, on the outbreak of war with Spain, and died Nov. 22, 1900.

Sherman, WILLIAM TECUMSEH, brother of the preceding, was born at Lancaster, Ohio, Feb. 8, 1820, was graduated from the military academy at West Point, in 1840, and served in Florida, Mexico, and elsewhere till 1853, when he resigned his commission. On the breaking out of the Civil war he became a lieutenant in the 4th Regiment Infantry, and May 14, 1861, was appointed colonel of the 13th Regiment He was present at the battle of Bull Run greatly distinguished himself at Shiloh, and subsequently took a prominent part in the operations under Grant around Vicksburg and Memphis. In March, 1864, he succeeded Grant as commander of the military division of the Mississippi, and at the beginning of May, simultaneously with Grant's advance in the east, he entered upon his invasion of Georgia. On September 1, after a number of battles, in which he displayed fine powers of strategy, he received the capitulation of Atlanta, and on the 14th of November began his famous 'march through Georgia,' which ended in the occupation of Savannah. Then turning northwards into the Carolinas and fighting more battles, he received the surrender of General J. E. Johnston, at Durham station, April 26, 1865, a surrender which brought the war to a close. Sherman was made a major-general in August, 1864, lieutenant-general in July, 1866, and general and commander-in-chief in March, 1869. He was retired in 1884. Died Feb. 14, 1891.

Sherman, ROGER, was born in Massachusetts in 1721. He was a member of Congress from 1774 till his death; a member of the committee of five appointed to draft the Declaration of Independence; a member of the boards

of war and ordnance; one of the committee to draw the Articles of Confederation, and a member of the Constitutional Convention of 1787. He was elected a member of the first United States Senate, and served from 1791 to 1793, dying in the latter year. He had remarkable influence in the revolutionary struggle.

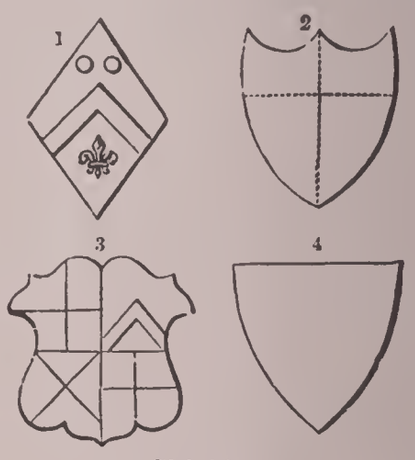
Sherman Act, THE, was passed by the 51st Congress, and approved by President Harrison on July 14, 1890. It was in the nature of a compromise between the Senate and House, the Senate having voted for free coinage of silver, while a majority of the House was opposed to it. The compromise measure, as offered by Senator Sherman, provided for the purchase by the secretary of the treasury of 4,500,000 fine ounces of silver bullion monthly, and for the coinage of silver dollars at the rate of two millions per month until July 1, 1891. The act, after prolonged debate, was repealed, Nov. 1, 1893, in extra session of Congress convened by President Cleveland for that purpose. The silver in the treasury when the act was repealed was 139,466,257 ounces, costing $125,888,929. Another Sherman act, like the one described due to John Sherman, had for its purpose the regulation of Trusts, or business combinations, and the preservation of competition. Upon it were based the legal proceedings against Trusts which have recently attracted great attention and led to the dissolution of some of the great illegal combinations. See *Trust.*

Shetland (shet'land), or ZETLAND, an insular county of Scotland, about 50 miles N. E. of Orkney; area, 551 sq. miles. It consists of about ninety islands and islets, of which twenty-nine are inhabited, the largest, Mainland, comprising about three-fourths of the total area. The coasts are generally bold and precipitous, presenting cliffs broken into the most rugged and fantastic forms, and attaining in Foula the height of 1200 feet above the sea. Their deep creeks and sounds form a succession of noble natural harbors. The Shetland pony is well known, and is not surpassed by any horse of its dimensions for strength and hardihood. The herring-fisheries are very valuable. The only town is Lerwick. Pop. of county, 28,166.

Shiel (shēl), LOCH, a fresh-water lake in Scotland, on the boundary between Inverness-shire and Argyleshire. It is about 15 miles long, but extremely narrow. It discharges by the river Shiel, which flows 3 miles N. W. to the sea at Loch Moidart.

Shield (shēld), a piece of defensive armor, borne on the left arm. Shields gradually disappeared with the introduction of firearms, but the target and broadsword were the favorite arms of the Scotch Highlanders up to the middle of the eighteenth century. See *Arms and Armor.*

Shield, in heraldry, the escutcheon or field on which are placed the bearings in coats of arms. The shape of the shield upon which heraldic bearings are displayed is left a good deal to fancy; the form of the lozenge, however, is used only by single ladies and widows. The shield used in funeral processions is of a square form, and divided per pale, the one half being sable, or the whole black, as the case may be, with a scroll border around, and in the center the arms of the deceased upon a shield of the usual form. See *Heraldry.*



Shields.

1, Lozenge shield. 2 and 3, Fanciful forms. 4, Spade shield — the best heraldic form.

Shield-fern, a common name for ferns of the genus *Aspidium*, nat. order Polypodiaceæ, so named from the form of the indusium of the fructification, which is roundly-peltate or kidney-shaped. The fronds of the species *A. fragrans* possess aromatic and slightly bitter properties and have been employed as a substitute for tea.

Shields (shēldz), JAMES S., United States senator and general, was born in Dungannon, county Tyrone, Ireland, in 1810; died at Ottumwa, Iowa, in 1879. At the age of 16 he came to America; at 33 was a judge of the Supreme Court of Illinois. He took part in the Mexican war as brigadier-general of Illinois troops; was shot through the lungs at Cerro Gordo, and severely wounded at Chapultepec. He served as Governor of Oregon territory, and as senator from Illinois, Minnesota, and Missouri. In the Civil war he was brig-

adier-general of volunteers, and did splendid service, resigning on account of broken health.

Shields, NORTH, a town and port of England, in Northumberland, on the north bank of the Tyne. It has large docks and is an important seat of the shipbuilding industry.

Shields, SOUTH, a borough of England, in the county of Durham, near the mouth of the Tyne, opposite to North Shields, and communicating with it by steam-ferry. The industries comprise glass, earthenware, alkali and chemicals, cordage, steam-engine boilers, and chain-cables and anchors, besides shipbuilding. The ports of North Shields and South Shields, formed by an expansion of the river into a wide bay, have been greatly improved and deepened by dredging and the construction of piers, and are capable of containing vessels of any size at their quays. Pop. (1911) 108,649.

Shiites (shī'īts), one of the two great sects of Mohammedans, who do not acknowledge the Sunna as a law, and believe that Ali, the fourth caliph after Mohammed, was his first lawful successor. The Persians are Shiites. See *Sunnites.*

Shikarpur (shīk-är-pör'), chief town of Shikarpur District, Sind Province, Bombay Presidency, India, 18 miles west of the Indus and 26 southeast of Jacobabad. It is an emporium for transit trade between the Bolan Pass and Karachi, but has lost much of its commercial importance since the opening of the Indus Valley Railway. The principal manufactures are carpets and coarse cotton cloth. Pop. 49,491.

Shikohabad (shē-kō-ä-bäd'), a town of India, in the Northwestern Provinces, Mainpuri District, 34 miles w. of Mainpuri town. It is the birthplace of several Hindu and Mussulman saints, and contains numerous temples and mosques. It has manufactures of sweetmeats and cotton cloth, and was formerly a great emporium for raw cotton. Pop. 11,826.

Shikohu (shē-kō'hö), the smallest of the four main islands of Japan, s. of Hondo, and E. of Kiushiu. Area, 6840 square miles. The surface is mountainous, with fertile valleys. Its products embrace subtropical fruits, vegetable wax, sugar-cane and silk. Pop. 3,013,817.

Shille'lagh, or SHILLALY, a Hibernicism for a stout oaken cudgel about 2 feet long, carried and used by Irishmen in faction fights and on similar occasions. Said to be derived from Shillelagh, a wood famous for its oaks.

Shilling (shil'ing), an English silver coin, equal in value to 12 bronze pence or one-twentieth of a pound sterling, and approximate in value to 25 American cents, to 1.25 French francs, and to 1.11 German marks.

Shillong (shēl'lōng'), a town of India, in the Khasi and Jaintia Hills District, the administrative capital of the province of Assam, on the Brahmaptura. It is on a table-land 4900 feet above sea-level. Pop. 8384.

Shiloh (shī'lō), BATTLE OF, the second great battle of the Civil War, fought April 6-7, 1862, at Pittsburg Landing, Miss., between the Union forces under Grant and Buell and the Confederates under A. S. Johnston and Beauregard. It was a Confederate failure but not a Union victory, and each side was weakened by about 10,000 men.

Shimoga (shē-mō'gä), chief town of Shimoga District, Mysore State, Southern India, 171 miles N. W. of Bangalore. Pop. 12,040.—Area of district, 3797 square miles; pop. 499,728.

Shimose (shē'mōs), an explosive of high power, made by Gian Shimose, a Japanese chemist and used in the war with Russia.

Shin, LOCH, a lake of Scotland, in the south of Sutherlandshire, stretching northwest to southwest about 24 miles, with an average breadth of about 1 mile.

Shingle (shin'gl), a thin piece of wood resembling a roofing slate, and used for the same purpose and in the same way. In Canada and the United States, and other places where timber is plentiful, shingles are extensively used for roof-covering.

Shingles (L. *cingulum*, a belt), an eruptive skin disease (*Herpes zoster*), which usually starts from the backbone and goes half round the body, forming a belt of inflamed patches, with clustered vesicles. It rarely encircles the body, though the popular opinion that if it does it will prove fatal is a delusion. It is sometimes produced by sudden exposure to cold after violent exercise, and sometimes follows acute affections of the respiratory organs. It seems to depend upon abnormal nervous action, as it frequently marks out upon the surface the part of the integument supplied by some one branch of a nerve. It is usually attended with more or less neuralgic pain and fever. It is a self-limited or cyclical disease, usually running its course in about a fortnight.

Shintoism (shin'tō-izm), one of the two great religions of Japan. In its origin it was a form of nature worship, but the essence of the religion is now ancestor worship and sacrifice to departed heroes.

Ship, the general term for a vessel intended for navigating the ocean, and especially a vessel intended for distant voyages. Ships are of various sizes, fitted for various uses, and receive various names, according to their rig and the purposes to which they are applied, as man-of-war ships, transports, merchantmen, barques, brigs, schooners, luggers, sloops, xebecs, galleys, etc. The name as descriptive of a particular rig, and as roughly implying a certain size, has been used to designate a vessel furnished with a bowsprit and three or four masts, each of which is composed of a lower-mast, a top-mast, and a top-gallant mast, and carrying a certain number of square sails on each of the masts. These masts are named, beginning with the foremost, the fore, the main, and mizzen masts; and when there is a fourth it is called the jigger-mast. The principal sails are named according to the masts to which they belong. (See *Sails.*) Owing to increase of size and the development of steam navigation this restricted application of the term ship is now of little value.

There were two primitive types of boats, from one or other of which, or rather perhaps from a joint development of both, the ship has developed. These were the raft and the canoe; the one, formed by fixing together planks, and spars, gave a floating surface strong and buoyant enough to support a cargo; the other, made by hollowing out the body of a tree and sharpening the ends, gave with little constructive art the rude model of a form fitted for navigation. In like manner there have been from time immemorial two distinct modes of propulsion, by oars and sails.

The ancient art of shipbuilding, like many other arts, was lost in the overwhelming tide of barbarism which overthrew the last of the great empires of antiquity. The ruder nations of Europe had to begin again in great measure on their own resources. The character of war galley of the ancients may possibly be preserved in the mediæval galleys applied to the same purpose. On the Mediterranean, too, an unbroken line of coasting ships may probably have continued to sail. But it appears evident that the progress made in shipbuilding under the Roman Empire, not to speak of the Greeks, the Phœnicians, and still earlier navigators, was much greater than was transmitted to mediæval Europe. Shipbuilding made little progress in Europe till the discovery of the compass, which was introduced in a rude form in the twelfth century, and had been improved and had come into common use in the fourteenth century. The opening up of the passage to India and the discovery of America made another epoch in its progress. In the building of large vessels the Spaniards long took the lead, and were followed by the French, who specially distinguished themselves in the theoretical study of the art. In the early progress of the art of shipbuilding the English took little or no part. When Henry VII built the *Henry Grace de Dieu*, which is regarded as the parent of the British navy, the English were greatly inferior to the nations of Southern Europe both in navigation and in shipbuilding. In the reign of Elizabeth the English fleet proved its superiority to that of Spain in respect of fighting capacity, but it was afterwards rivaled by that of Holland. Rapid improvement was made in shipbuilding during the seventeenth and eighteenth centuries in England as well as the maritime countries of Europe. The first three-decker was built in England in 1637. She was called the *Sovereign of the Seas*, and was deemed the best man-of-war in the world. In 1768 the French adopted three-deckers; and from their application of science they acquired a decided superiority in the size and models of their ships over the English. In the early part of the nineteenth century the lead in improvement was taken by the United States, a fact which was significantly displayed in the war of 1812. English builders were at first sceptical as to American improvements; but in 1832 Scott Russell theoretically established the principles on which speed in sailing depends — principles which had already been practically applied not only by the Americans but by the Spaniards. From the time of their theoretical establishment they were rapidly adopted in England, and a race of improvement began between Great Britain and America. The true principles of construction both in build and rig were exemplified in the celebrated Baltimore clipper schooners, which were sharp in the bow, deep in the stern, of great length, and lying low in the water, with long, slender masts, and large sails cut with great skill. The same principles were afterwards applied to square-rigged vessels, and produced the English and American clipper ships which did so

much to develop the trade of India, China and Australia with both Europe and America.

A great change came over the art of shipbuilding when steam was introduced and wood gave place to iron and then to steel. The development of the steamboat, for river traffic, was quickly followed by that of the steamship, for ocean use, the first of these to cross the ocean being the *Savannah*, which in 1819 crossed from Savannah to Liverpool, partly by sail. In 1824 the *Fulton* and in 1825 the *Enterprise* proceeded from England to India, largely relying on their sails. The first steamer built expressly for regular voyages between Europe and America was the *Great Western*, launched in 1837. She was propelled by paddle-wheels, but about the same time Ericsson invented his screw-propeller, which was soon adopted in sea-going ships. (See *Screw-propeller.*) Iron vessels were built early in the century for canal service, then for river service, and later for packet service on the coasts. About 1838 iron vessels were built for ocean service, but the first ocean-going steamship in its present form, built of iron and propelled by the screw, was the *Great Britain*, launched in 1842. Compound engines were first introduced in 1854. The use of iron and steel in the construction of ships long made Britain, where there is such an unlimited supply of iron, and such skill in working it, the home of shipbuilding, but the United States has now the necessary plants to build vessels second to none in the world, the Delaware River being the most active locality in this art. Many of the vessels belonging to the great ocean lines are splendid specimens of naval architecture, some of them being over 800 feet in length, having a capacity of 45,000 tons, and with engines working up to 50,000 horse-power. These large vessels are all propelled by steam, though some sailing vessels of very large size are now in use.

An iron vessel is lighter than a wooden one of the same size, and with iron the same strength may be obtained with less weight. Iron is also far more manageable than wood, as it can be bent with ease into any required shape. Steel, which is now superseding iron for building ships, is a still lighter material and is equally manageable. In wooden ships the keel forms the base of the whole structure; from it rise on either side a large number of *ribs*, consisting of strong timbers usually built up of several pieces, and having the requisite curvature according to the shape of the vessel; to the ribs are attached by bolts or wooden pins the planks that form the outer skin or covering, the interstices between the planks being made water-tight by calking; internally beams extend from side to side to support the deck or decks. In steel or iron ships the keel is of far less importance than in wooden ships, and does not as in them hold the position of foundation or 'back-bone' to the whole structure, since an iron vessel ought to be mutually supporting throughout. The keel is constructed of plates riveted together, and sometimes is made hollow. From it, and riveted to it on either side, rise the ribs, which are girders built up of plates, and to the ribs on the outside is fastened the plating. The plating consists of sheets of iron-plate overlapping each other at the edges, where they are riveted together. There may be an inner skin of plating as well as an outer. The ribs are tied together and at the same time held apart by beams of iron, which support the deck or decks. The decks consist of wooden planking with thin metal plates below. In the finer class of ships there are water-tight partitions or bulkheads.

Concrete ships were introduced in 1916, Norwegian shipbuilders having the credit for the invention. The first concrete ship built in the United States was the *Faith*, a 7900-ton vessel, launched at Redwood City, Cal., in March, 1918. In the construction of these ships wooden forms are placed in position and the concrete mixture, in a fluid state, is poured into them. The concrete has within it a skeleton of steel rods, running fore and aft, with interlaced rods of steel supplemented by wire mesh. Heavy oil engines of the Diesel type (*q. v.*) are being used more and more for the propulsion of vessels. See *Ironclad Vessels, Gunboat, Navigation, Torpedo-boat, Navy*, etc. The promotion of ship construction in the United States is under the direction of the Shipping Board and the Emergency Fleet Corporation. See *Shipping Board.*

Ship Canal, a canal for the passage of seagoing vessels. Ship canals are intended either to make an inland or comparatively inland place a seaport, or to connect sea with sea and thus obviate a long ocean navigation. Of the former kind are the Manchester Ship Canal, opened in 1894, and the Amsterdam Canal. Of the latter kind are the Panama Canal, the Kiel Canal, the Suez Canal and Cape Cod Canal. The Panama Canal, connecting the Atlantic Ocean with the Pacific, is the greatest engineering work of the kind the

world has ever seen. See the separate articles.

Ship Railway a method of conveying ships overland in a cradle on rails or in a water-tank on a wheeled truck or car. Such a railway is said to have been in operation on the Isthmus of Corinth as early as 427 B. C., conveying a vessel 149 feet long and 16 wide. The Greeks, in 831 A. D. and the Venetians in 1483 are said to have used a tramway for this purpose. Several ship railways were projected in the last century, one to cross the Isthmus of Suez in 1861, one across Honduras in 1872, and one in 1879 across the Isthmus of Tehuantepec. None of these were constructed. A ship railway was begun in Nova Scotia in 1888, but was abandoned in 1891.

Shipka Pass (shīp'ka), a pass in the Balkans, about 4600 feet above the sea, the scene of a desperate and bloody ten days' struggle during the Russo-Turkish war (August and September, 1877). In his futile endeavors to take Fort Nicholas at the summit of the pass from the Russians, Suleiman Pasha lost 20,000 of his best men.

Shipley (ship'li), a town of England, in the West Riding of Yorkshire, on the Aire, 3 miles N. W. of Bradford. The inhabitants find employment in the worsted manufacture, or in the large stone-quarries in the neighborhood. Pop. (1921) 28,289.

Ship-money an impost levied at various times in England, especially on the seaports, for the purpose of furnishing ships for the king's service. Having lain dormant for many years, it was revived by Charles I, who in 1634 levied it on the coast towns, and in 1635 issued writs for ship-money all over the kingdom. The tax met with strong opposition, and the refusal of John Hampden to pay the twenty shillings at which he was rated was one of the proximate causes of the civil war.

Shipping Board UNITED STATES, a board authorized by Congress in 1916 during the World War, comprising the General Administration, the Claims Commission and the Emergency Fleet Corporation. It built up a great merchant marine to offset the destruction of ships by German submarines. At the beginning of 1923 the United States was second among the merchant fleets of the world, having a seagoing tonnage of 12,500,000, contrasted with Britain's 19,000,000. The total world tonnage was estimated at 56,800,000.

Ship's Husband, an agent, appointed by the owner or owners of a vessel to see to her repairs, stores, etc., prior to a voyage.

Ship Subsidy, pecuniary aid to shipping by grant of the government. Great Britain, Germany, France, Italy, Japan and other nations encourage shipping by various forms of subsidy, either direct or indirect. The question of subsidies for United States shipping came up in an acute form in 1922 when President Harding called attention to the fact that the vast fleet which the government had built up was costing the Treasury a loss of $50,000,000 yearly. He pleaded for government aid so that the ships might be privately owned and operated without loss to their prospective owners. The Ship Subsidy bill was passed by the House Nov. 29, 1922, but rejected by the Senate.

Ship-worm, or TEREDO, the popular name of a lamellibranch mollusk, distinguished by the elongation of the respiratory 'siphons' or breathing-tubes conveying water to the gills, which give to this mollusk a somewhat vermiform or worm-like aspect. It has gained great notoriety from its boring habits, occasioning great destruction to wooden ships, piers, etc.

Shipwreck The most notable disasters at sea have been: the Royal Mail steamers *Rhone* and *Wye*, wrecked by hurricane, with a loss of 1000 lives in 1867; the *Atlantic*, wrecked off Nova Scotia in 1873, over 500 lives lost; the *Utopia*, collision off Gibraltar in 1891, 574 lives lost; *Elbe*, collision in North Sea in 1895, 380 lives lost; U. S. S. *Maine*, blown up in Havana Harbor in 1898, 262 lives lost; *La Bourgogne*, collision off Sable Island in 1898, 560 lives lost; excursion boat, *General Slocum*, burned in East River in 1904, over 1000 lives lost; *Titanic*, collision with iceberg off Grand Banks in 1912, 1503 lives lost; *Empress of Ireland*, collision with *Storstad* in St. Lawrence River in 1914, 1000 lives lost; *Lusitania*, sunk by German submarine off Ireland, May 7, 1915, 1154 lives lost.

Shiraz (shē'räz), a celebrated city of Persia, capital of the province of Fars, 165 miles N. E. of Bushire. It is situated at an elevation of 4500 feet above the level of the sea, in a large and fertile plain covered with rose-gardens, vineyards, cypress groves, and orchards. Founded about the beginning of the eighth century, it was long one of the most splendid cities of Persia, the residence of the ruler, the seat of

science and art, celebrated for its magnificent buildings, its delicious climate, its elegant manufactures, and its extensive trade. It lost much of its importance after being conquered by Timur in the end of the fourteenth century, and it was almost entirely destroyed by an earthquake in 1812, and again in 1853. At present it is known chiefly for its wines and its inlaid work. Near the city are the tombs of Sadi and Hafiz, the poets. Pop. est. from 30,000 to 50,000.

Shire (shīr; from Anglo-Saxon *sciran*, to divide), the name applied to the larger divisions into which Great Britain is divided, and practically corresponding to the term county, by which it is to a large extent superseded, though the word is in considerable use as a termination to county names, as Brookshire, Lancashire, etc. In some cases the shires are identical with the old Saxon kingdoms; such are Kent, Sussex, Essex, Middlesex, Surrey, Norfolk and Suffolk. Other kingdoms were for convenience divided into several shires, and some shires which once had a separate existence have been merged into others. The head of the shire was originally the ealdorman (earl); the duties of the ealdorman, however, ultimately devolved upon the shire-reeve (sheriff). Scotland followed the example of England as regards the division of the country into shires, and twenty-five shires are enumerated in a public ordinance of 1305. In Scotland Kirkcudbright is neither a county nor a shire, but a stewartry, and in England there were at one time three counties palatine. (See *County Palatine.*) The shires in England were subdivided into *hundreds*, *sokes*, *lathes*, etc., and these again into *tithings;* in Scotland they were subdivided into *wards* and *quarters.* —*The Shires* is a term loosely applied to a belt of English counties running in a northeast direction from Devonshire and Hampshire, but often used for the midland counties generally.

Shiré (shē'rā), a river of Southeastern Africa, draining Lake Nyassa into the Zambesi, which it enters on its left bank, after a course of about 270 miles nearly due south. It is navigable throughout its entire length, with the exception of about 35 miles of falls and rapids, during the course of which it descends as much as 1200 feet. The upper part of the Shiré is in Nyassaland, the lower part in Portuguese territory.

Shirley (shir'li), a former town of Hampshire, England, 2 miles N. W. of Southampton, of which it is now a suburb, having been brought within the limits of Southampton.

Shirley, JAMES, dramatist, was born in London in 1596, and was educated at Merchant Taylors' School, St. John's College, Oxford, and Catherine Hall, Cambridge. He took holy orders, but soon after went over to the Church of Rome, and for some time made a living as a schoolmaster. Then he became a playwright, and had written more than thirty regular plays, tragedies, and comedies before 1642, when parliament suppressed theaters. After the Restoration some of his comedies were revived, but he did not again attempt to write for the stage. He died October 29, 1666, it is said, of fright caused by the great fire. Shirley was the last of the great writers who belong to the school of Shakespeare, and his dramas, though they do not display much inventive power, are yet poetical, and the dialogues full of animation. His best tragedy is perhaps *The Traitor*, and his best comedy *The Lady of Pleasure*, both produced in 1635; but Shirley himself preferred *The Cardinal* (1641), an attempt to compete with Webster's *Duchess of Malfi.* He was the author also of three small volumes of poems and masques.

Shirwa (shir'wȧ), or TAMANDUA, a lake of southeast Africa, lying on the left side of the Shiré, to the southeast of Lake Nyassa. It is a secluded basin, lying at an elevation of 2000 feet above the sea, and surrounded by mountains which reach a height of 7000 to 8000 feet. It is mostly shallow, and infested by hippopotami and crocodiles.

Shisdra (shis'drȧ), a town of Russia, government of Kaluga, 80 miles southwest of Kaluga; has manufactures of woolen cloth, glass and leather. Pop. 10,572.

Shishak (shī'shak), an Egyptian king, mentioned by the Hebrew writers, the Sheshenk I of the monuments, and the first sovereign of the Bubastite twenty-second dynasty, established about 961 B.C. It was he to whom Jeroboam fled for protection when he fell under the suspicion of Solomon; and in the fifth year of Rehoboam he invaded Judah, and returned with the treasures of the temple and the palace. A remarkable sculpture at the temple of Karnak gives a list of 130 names of towns and peoples, including towns both of Judah and of Israel, conquered in this expedition by Shishak, who appears to have been one of the ablest and most powerful of the Egyptian monarchs. His reign lasted at least twenty-one years.

Shittim-wood (shit'im), of which the tabernacle in the wilderness was principally constructed, was the wood of the shittah-tree of the Bible, which is supposed to be the *Acacia seyal* of the Sinaitic peninsula. (See *Acacia.*) It is a light but cross-grained and enduring wood, of a fine orange-brown color.

Shoa (shō'ä), a province in the south-east of Abyssinia, often holding the position of a semi-independent kingdom; area, 26,000 sq. miles. It consists (like the rest of Abyssinia) mostly of plateaus reaching up to an elevation of 10,000 feet on the southeast and south, overtopped by higher mountains, and intersected by numerous streams mostly tributaries of the Blue Nile. The capital is Ankober. In 1889 Menelek, king of Shoa, became ruler of all Abyssinia, which has since become a protectorate of Italy.

Shock, in medicine, a sudden vital depression of the system produced by violent injuries or violent mental emotions. It is especially a surgical term. The vital phenomena of the body — consciousness, respiration, heart-action, capillary circulation — are depressed in proportion to the shock received by the nerve centers. In the state of collapse consequent upon a shock the patient lies completely prostrate, the face pale and bloodless, the skin cold and clammy, and the features contracted and expressive of great languor. There is also extreme muscular debility, and the pulse is frequently so weak as scarcely to be perceptible. Incoherency, drowsiness, or complete insensibility is often manifested on the part of the patient. Shock results either in a complete suspension of the action of heart, causing death, or passes into reaction; and the treatment of shock is to be directed to the immediate development of reaction. In mild cases external warmth, a little stimulant, and rest are all that is required; but in the severer forms a more liberal recourse to heat and stimulants is absolutely necessary, and should be continued until indications of commencing reaction appear. The heat should be applied to the pit of the stomach and the extremities by means of hot flannel, hot water tins, or like appliances. The stimulant most recommended is brandy in hot water, and this should be followed by nourishment, such as beef-tea.

Shoddy (shod'i), the fibrous substance composed of woolen rags torn fine in a machine called a 'devil,' and converted into cheap cloth by being mixed and spun with a certain proportion of fresh wool.

Shoeburyness (shö'ber-i-nes), a village of Essex, on the estuary of the Thames, opposite Sheerness, and 45 miles E. of London. A school of gunnery is maintained here for the purpose of giving practical instruction to officers and men of the artillery, and for carrying on experiments in artillery and ammunition. At Shoeburyness all new inventions in armor, whether for fortifications or for ironclads, are tested, and all new guns are tried. Pop. 5006.

Shoes, coverings for the feet, generally made of leather in Europe and America, but in Holland and France often of wood, and in China and Japan of paper and other fabrics. The shoe is a combination of the sandal of the oriental races and the moccasin of untanned hide of savage races — sole without upper and upper without sole. The first allusion to a shoe in the Old Testament is where Abraham refuses to take so much as a 'shoe-latchet' from the King of Sodom. For 'shoe' in this instance we are probably to understand 'sandal'; but shoes proper, as well as sandals, seem to have been used among the Jews; for on the black obelisk from Nimroud Jews are represented as wearing shoes or boots with turned-up toes, similar to those worn by orientals in the present day. The Romans used various kinds of shoes, such as the *solea* or sandal; the *calceus*, which covered the whole foot, somewhat like our shoes, and was tied with a latchet or lace; and the *caliga*, a very strong kind of shoe, sometimes shod with nails, worn by the soldiers, who were thence called *caligati.* Both in ancient and in modern times the fashion of shoes has varied much, just as in other articles of dress. In the reigns of Henry I and Stephen, shoes were made for the fahionables with long points stuffed with tow, and made to curl in the form of a ram's horn; and in the reign of Richard II the points had increased to such an extent that they reached the knee, to which they were secured by chains of silver or gold. In the eighteenth century, among the ladies, absurdly high-heeled shoes were the rage, a fashion which has been revived within recent years. The present simple form of shoe was adopted in the early part of the seventeenth century, and somewhat later the shoe buckle came into use. In the early part of the nineteenth century buckles appear to have become unfashionable, their place being supplied by the simpler and less costly shoe-strings. To the

same period belongs another improvement, that of making shoes right and left. Boots are a variety of shoe with the upper leathers lengthened so as to protect part of the leg. Till recently the making of boots and shoes was a purely manual handicraft; now, with the exception of the finest and best finished qualities, the manufacture is done almost entirely by machinery, and has become a thriving industry in New England and in some other parts of the United States.

Shogun (shō'gun), the name of the military chiefs of Japan, who early in Japanese history usurped the rule of the emperors or Mikados and reigned supreme, until the revolution of 1868 restored the Mikado to power. For a time (1854-68) the name of Tycoon was erroneously given to the Shogun.

Sholapur (shō-lä-pör'), chief town of Sholapur District, Bombay Presidency, India, 150 miles by rail from Poona. Its situation between Poona and Haiderabad has made it, especially since the opening of the railway in 1859, the center for the trade of a large extent of country. Its chief industry is the manufacture of silk and cotton cloth. Sholapur was stormed by General Munro in 1818, when the whole of the Peshwa's territories were incorporated in the Bombay Presidency. Pop. (including cantonment), 75,288.

Shooting-star, a meteor in a state of incandescence, caused by friction when passing through the atmosphere, and seen suddenly darting along some part of the sky. They are very numerous, and indicate that small fragments of matter are abundant in the area of the solar system. See *Aerolite* and *Meteor.*

Shore (shōr), JANE, the wife of a rich goldsmith of London in the fifteenth century, and mistress of Edward IV. After the death of Edward, in 1483, she seems to have been the paramour of Lord Hastings, whom Richard III, then Duke of Gloucester, and protector, suddenly ordered to be beheaded, June 13, 1483. Richard had accused Hastings of conspiring against him along with Jane Shore. The charge could not, however, be substantiated, and he directed her to be tried for lewdness by the spiritual court, and she was obliged to do public penance at St. Paul's. She found a new protector in the Marquis of Dorset, after whose banishment she seems to have married one Lynom, the king's solicitor. She is supposed to have died about 1527, at an advanced age, during the reign of Henry VIII.

Shorea (shō're-a), a small genus of Indian plants, nat. order Dipteraceæ. One species (*S. robusta*) yields the timber called in India *sal* or *saul.* See *Sâl.*

Shoreham (shōr'am), or NEW SHOREHAM, a seaport town of England, in the county of Sussex, 6 miles west of Brighton, at the mouth of the Adur, here crossed by a suspension-bridge. It has a fine old parish church, which dates from about 1100. The harbor is encumbered by a bar, but carries on considerable trade. Pop. 5731.— OLD SHOREHAM was situated a mile N. W. of the modern town, and its harbor was long a great outlet to the Continent, but in the fifteenth century it got silted up.

Shore-hopper (*Orchestia littorea*), a genus of crustaceans of the order Amphipoda, having the first pair of legs of smaller size than the second pair. By this, and by its more compressed body, it may be distinguished from the familiar sand-hopper, in company with which it is often met on sandy coasts.

Shorthand (short'hand), the method of writing by which the process is so abbreviated as to keep pace with speech. It is also known, according to the principle underlying the particular system, as tachygraphy (quick writing), brachygraphy (short writing), stenography (compressed writing), and phonography (sound writing). It was practiced by the ancient Greeks and Romans, not only on account of its brevity but for purposes of secrecy; but all knowledge of the art was lost from the tenth century until the end of the sixteenth, when modern shorthand had its birth in the publication by Dr. Timothy Bright of his *Characterie* (1587), and by Peter Bales of his *Arte of Brachygraphie* (1590). In these early systems arbitrary signs were used in most cases to denote each word. The earliest system of shorthand of any practical importance was that of John Willis, whose *Arte of Stenographie* (1602) became very popular. It was based on the common alphabet, with the addition of arbitrary signs; and this, indeed, was the character of the numerous systems which obtained until the time of Pitman. Among Willis' imitators were T. Shelton, whose system (1620) was used by Samuel Pepys, and that of Jeremiah Rich, whose system (1646) was commended by Locke. Rich's system was improved by William Mason (1672), the best shorthand writer of the seventeenth century; and Thomas Gurney published

his *Brachygraphy*, founded on Mason's system, in 1753. The use of Gurney's system has been perpetuated by his descendants, who have been the official shorthand writers of the houses of parliament since the beginning of the last century. In 1767 appeared the *Universal English Shorthand* of John Byrom, an a, b, c system characterized by 'simple strokes and no arbitrary characters'; and in 1780 was published an improvement of Byrom's system by William Mason. Samuel Taylor published his *Stenography* in 1786. This, which is the best of all the a, b, c systems, contributed largely to make stenography popular, and it was the system which was almost universally used until Isaac Pitman gave his *Phonography* to the world in 1837. In comparison with Gurney's system, the Taylor system possesses more easy and natural outlines, and is therefore capable of being written with a greater degree of speed. Like Byrom, Taylor discarded arbitrary characters; but Harding, who reëdited his system in 1823, introduced a few.

Pitman had a number of predecessors, whose systems, like his own, were strictly phonetic. These systems, however, never obtained any footing, while Pitman's almost immediately became popular. Like all other phonetic systems Pitman's rejects the ordinary orthography, and writes words according to their sounds; thus *come* becomes *kum; phonetic* becomes *fonetik; climax* becomes *klimaks*, and so on. Discarding the common alphabet, which formed the basis of the stenographic systems, it adopted an alphabet of its own, consisting of a series of straight lines, curves, dashes, dots, etc., each representing a distinct sound. For instance, a line sloping down from left to right represents the sound *p*, and a heavy line *b;* a vertical line, *t*, and a heavy vertical line *d;* a line slanting down from right to left is *ch;* a heavy line, *j;* a horizontal line is *k;* heavy, *gay*. The different segments of a circle represent other characters. As an example, the word *take* is represented by but two strokes, a vertical and a horizontal, joined together, forming the sounds *t* and *k*. The vowel *a* is indicated by a dot. The positions of these dots indicate the vowel sounds, but they are frequently omitted, especially in rapid writing. The Pitman alphabet is the basis of a highly ingenious and complex system which aims at securing the greatest degree of brevity consistent with legibility. This end it endeavors to attain by a variety of devices, grammalogues or word signs, phrases, etc., forming integral parts of the system.

Variations of the Pitman system appeared in America, notably those by Benn Pitman, Andrew J. Graham, James E. Munson, and others. Benn Pitman, a brother of Isaac Pitman, came to America in 1852, and soon after prepared a series of textbooks which have been revised and reissued from time to time. The Benn Pitman system differs but little from the Isaac Pitman system, and is widely used.

In 1877 J. D. Everett published his *Shorthand for General Use*. He claimed that he had adhered to the phonetic principle more strictly than Pitman, in that, by a variety of devices, all vowels were indicated. In Edward Pocknell's *Legible Shorthand* (1881) there was a tendency to return to the earlier alphabetic style, with a greater use of arbitrary signs.

In France the system of Prévost (1826) improved by Delaunay (1878) and that of Duployé (1867) are popular. The Sloan-Duployan system (1882) is an English adaptation of the Duployé system; and the Pernin-Duployé system (1877) an American adaptation. The Gabelsberger system (1834), based upon the ordinary longhand, is popular in Germany, and adaptations of it are in use throughout Europe. Gabelsberger's system is founded on modifications of geometrical signs, so adjusted as to facilitate rapid writing as in ordinary longhand, while the vowels are indicated by the shape or position of the consonants. The W. Stolze system (1840) was based on this. It was adapted to English by H. Richter (1886).

The so-called *script* shorthand, based on the slope customary in longhand, dates back to 1787, and was the invention of Simon George Bordley. Oxley, in 1816, introduced a method based on *script*. The Oxford Shorthand (1888) follows this principle. The exponents of the *script* method claim that while there is a greater gain in speed and legibility, the longhand of the learner is not hurt by its practice. The alphabetic signs, also, are few and simple; the vowels and consonants are joined and written in their natural order, and the various positions of the alphabetical outlines in other systems are abolished. The Gregg is probably the most popular of the many *script* styles.

The Gregg system of shorthand, invented by John Robert Gregg, first published in Liverpool, England, in 1888 and introduced to America in 1893, has gained wide popularity. It differs from the two Pitman systems in that there are no

heavy lines, and the outlines are mostly sloping, being based on the movements of the hand in longhand writing.

Very high speeds are possible by the modern shorthand systems. As illustration, Herman J. Stich of New York, using the Isaac Pitman system, took dictation from a court record dictated at the rate of 300 words a minute for five minutes and transcribed it with only two errors for each 300 words. In 1921 at the annual convention of the Shorthand Reporters' Association at Niagara Falls, Ontario, Albert Schneider, using the Gregg system, made a new record by taking straight literary dictation for five minutes at 215 words a minute and transcribing it with an accuracy of 98.3 percent perfect.

Shorthorns, a breed of cattle externally distinguished by the shortness of their horns, which originated in England in the beginning of the last century. Starting in the Tees valley under the name of Durhams, Teeswaters, or Shorthorns, they soon spread over all the richly pastured districts of Britain. They are excellent for grazing purposes, being of rapid and large growth with aptness to fatten, but are inferior to some other breeds for dairy purposes. They have been successfully introduced in the United States.

Shoshone Falls (sho-sho-nē'), on Lewis or Snake River, in Idaho. Among the waterfalls of North America they rank next to that of Niagara in grandeur, being about 250 yards wide and 200 feet high.

Shoshones, or SNAKES, a tribe of North American Indians inhabiting a considerable stretch of territory in Idaho, Utah, Nevada, etc. They live partly by hunting and fishing, many of them also on roots and small animals. They are estimated to number about 5000.

Shoshong (shō-shong'), a town in the British protectorate of Bechuanaland, South Africa, about 400 miles N. of Kimberley, with which it is connected by road and telegraph. It is the gateway between Southern and Central Africa, the three great routes from Griqualand West, the Orange Free State, and the Transvaal meeting here, and again branching off north to the Zambesi, northeast to the Matabele country, and northwest to Damaraland. Pop. estimated at 30,000.

Shot, a term applied to all solid projectiles fired from cannon, and also to hollow projectiles without bursting charges, as the Palliser shot. Solid shot have gradually disappeared since the introduction of rifled guns, which fire elongated shot with more or less conical heads. Some of the shot fired by the immense guns now used weigh not far short of a ton. Smooth-bored ordnance still use solid round shot and case-shot. Case-shot consists of iron balls packed in iron or tin cylindrical cases. Grape differs only in the balls being larger. (See *Shell*, *Cannon*, etc.) Shot is also the name given to the small round pellets of lead used with sporting guns for shooting small quadrupeds and birds. This kind of shot is made by dropping the melted lead through the holes of a colander set at a considerable height above water, the drops naturally assuming the globular form.

Shoulder-joint, the articulation of the upper arm or humerus with the glenoid cavity of the scapula or shoulder-blade. (See *Arm.*) The shoulder-joint forms an example of the ball-and-socket joints, the ball-like or rounded head of the humerus working in the shallow cup of the glenoid cavity. Such a form of joint necessarily allows of very considerable movement, while the joint itself is guarded against dislocation or displacement by the strong ligaments surrounding it, as well as by the tendons of its investing and other muscles. The muscles which are related to the shoulder-joint are the *supraspinatus* above, the long head of the *triceps* below, the *subscapularis* internally, the *infraspinatus* and *teres minor* externally, and the long tendon of the *biceps* within. The *deltoid* muscle lies on the external aspect of the joint, and covers it on its outer side in front, and behind as well, being the most important of the muscles connected with it. The movements of the shoulder-joint consist in those of abduction, adduction, circumduction, and rotation — a 'universal' movement being thus permitted; and its free motion is further aided, when the bony surfaces are in contact, by separate movements of the scapula itself, and by the motions of the articulations between the sternum and clavicle, and between the coracoid process and clavicle also. The biceps muscle, from its connection with both elbow and shoulder joints, brings the movements of both into harmonious relation. The shoulder-joint is liable to various diseases and injuries. Local injury may result in inflammation of the joint, while special diatheses or diseased conditions of constitutional origin may each give rise, either *per se* or through injuries, to such lesions as strumous or scrofulous disease of the joint, to syphilitic lesions, and to gouty

or rheumatic attacks. Of the accidents to which the joint is liable *dislocations* are by far the most frequent.

Shovel (shuv'l), Sir Cloudesley, a British admiral, born of poor parents in 1650, entered the navy as a cabin-boy, but soon rose by his talents, commanded the *Edgar* at the first fight of Bantry Bay, and shortly afterwards was knighted. He distinguished himself at Beechey Head (1690), La Hogue (1692), and Malaga (1704), and in 1705 was named rear-admiral of England, and succeeded Sir George Rooke as commander-in-chief of the British fleets. He took part in the capture of Barcelona (1705), and in the unsuccessful attempt upon Toulon (1707). When returning home with the fleet (October 22, 1707) he was wrecked on the rocks near Scilly, and of the 800 men on board his ship, *The Association*, not a soul was saved. His body was washed on shore next day, and buried in Westminster Abbey.

Shovel Board, Shove Board, or Shuffle Board, a game in which counters, disks, or pieces of money are shoved over a smooth surface on which nine squares are marked off, the object being to send the pieces on these squares, where they count according to the number marked on the square on which they rest. Also a long, smooth board where counts are made by sending the disk nearest the end without going off.

Shovel-fish (*Scaphiorhynchus cataphractes*), a genus of ganoid fishes belonging to the Sturionidæ or sturgeon family, and found in North American rivers. It is so named from the flattened form of the head.

Shoveller-duck (*Spatŭla clypeāta*), a genus of Anatidæ or ducks, distinguished by its long bill, of which the tip is hooked and broadened. The average length of this bird is about 18 or 20 inches. In the male the colors are rather gay and varied — green, white, brown, pale blue and black. The coloring of the female is more somber. The shoveller duck is found in North America and Europe.

Showbread (shō'bred), in the Bible, the twelve loaves of bread, representing the twelve tribes of Israel, which were exhibited before the Lord on the golden table in the sanctuary. They were made of fine flour unleavened, were changed every Sabbath, and were eaten by the priests only.

Shrapnel (shrap'nel), Henry, an English general, who entered the Royal Artillery in 1779, served with the Duke of York's army in Flanders, and shortly after the siege of Dunkirk invented the case-shot known by the name of shrapnel-shells, an invention for which he received from government a pension of £1200 a year in addition to his pay in the army. He retired from active service in 1825, attained the rank of lieutenant-general in 1827, and died in 1842.

Shrapnel-shell. See *Shell.*

Shreveport (shrēv'port), a city, parish seat of Caddo Parish, in N. W. Louisiana, on the Red River, near the Texas border. It is situated in a splendid cotton-growing region. The development of the North Louisiana high-gravity oil fields has created a great oil industry here. Natural gas is produced. It has eight railroads. Pop. (1910) 28,015; (1920) 43,874.

Shrew (shrö), or Shrew-mouse, a genus of mammals belonging to the order Insectivora, and to be carefully distinguished from the ordinary and common mice (Muridæ), which are included in the order Rodentia; and from the dormice (Myoxidæ), also belonging to the Rodent order. The shrews form the family Soricidæ, and the genus *Sorex* includes the typical members, three of which are found in Europe and Asia, namely, the common shrew, the lesser shrew, and

Common Shrew (*Sorex araneus*).

the water shrew, while there are a number of species in North America. Here also are the red-toothed shrews, belonging to the allied genus *Blarina.* The common shrew (*S. araneus* or *vulgāris*) averages about 4 inches in length, the square tail making up half of this measurement. It may readily be distinguished by its prolonged muzzle, by the teeth being colored brown at the tips, and by the reddish-brown fur. It feeds upon insects and their larvæ, and inhabits dry places, making a nest of leaves and grasses. Its habits are chiefly nocturnal. Shrews are very voracious in their habits, and frequently kill and devour one another. They secrete a fluid of disagreeable odor

in special glands, and this odor prevents larger animals from eating their flesh. In former days the bite of the shrew was accounted venomous, while its body, variously treated, was regarded as a cure for many complaints. The water shrew (*S.* or *Crossopus fodiens*) attains a total length of from 4½ to 5 inches. The snout is not so pointed as that of the common shrew. The ears are very small. The color is black on the upper and white on the under parts. A prominent swimming fringe of stiff white hairs is found on the tail and on the toes, and forms a distinctive feature of the species. Its food resembles that of the common shrew, but aquatic larvæ appear to form a large part of its nutriment. It makes its burrows in the overhanging banks of rivers and lakes, and dives and swims with great facility.

Shrew-mole (*Scalops aquaticus*), a genus of insectivorous mammals, belonging to the family of Soricidæ or shrew-mice, but also by some zoologists placed in the Talpidæ or mole family. It is found in North America, usually near rivers and streams, and burrows after the fashion of the common mole, like which, also, its fur is fine and closely set. The average length is about 7 inches.

Shrewsbury (shrös'ber-i), a municipal and parliamentary borough of England, capital of Shropshire, situated on a slightly elevated peninsula formed by a bend of the Severn, 42 miles N. W. of Birmingham. It consists of some handsome modern houses and many old timbered houses of very picturesque appearance. Three bridges cross the Severn and connect the town with its suburbs. Among objects deserving of notice are the remains of the old walls; the ruins of the castle; the Church of Holy Cross, originally attached to a magnificent Benedictine abbey, founded in 1083; the grammar school ranking high among public schools, founded by Edward VI in 1551, and removed to new buildings at Kingsland in 1882; the market-house, of the time of Queen Elizabeth; statues of Lords Clive and Hill, etc. The chief manufactures are glass-staining, the spinning of flax and linen yarn, iron-founding, brewing, the preparation of brawn, and the making of the well-known 'Shrewsbury cakes.' In 1403 the famous battle which issued in the defeat of Hotspur and the Earl of Douglas, his ally, by Henry IV was fought in the vicinity. Pop. 29,389.

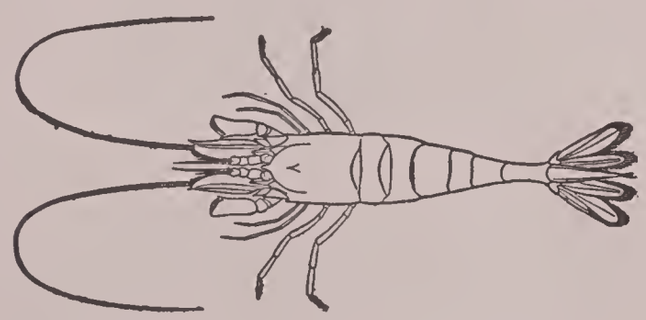
Shrike (shrīk), a general name applied to the members of a family (Laniidæ) of insessorial birds belonging to the dentirostal division of the order. The family is conveniently divided into two groups, the Laniinæ, or true shrikes, and the Thamnophilinæ, or bush-shrikes. The genus *Lanius* is distinguished by the broad base of the bill, which is hooked at the tip. The nostrils, which are situated laterally, are surrounded by bristles. The fourth quill is longest in the wings, and the tail is of graduated or conical shape. The great Northern shrike of North America imitates the sounds of other birds. This species is colored gray on the upper and white on the under parts; the quills of the tail being black with white tips, while a band of black crosses the forehead, surrounds the eyes, and terminates at the ear covers. The average length is about 9 or 10 inches. The food consists

Great Northern Shrike of North America.

of mice, shrew-mice, small birds, frogs, and insects; and these birds have the habit of impaling their prey on thorns of trees, in order to tear it to pieces with greater ease, a habit which has obtained for them the name of butcher-birds. The red-backed shrike (*Lanius* or *Enneoctŏnus collurio*) and the wood-chat shrike (*L.* or *E. rufus*) are European species. In the Thamnophilinæ, or tree shrikes, the bill is long and possesses an arched keel, the tip being hooked and bristles existing at the base. Some of the species attain a length of from 12 to 13 inches. They are common in South America. The name of drongos or drongo-shrikes has been given to certain American birds allied to the shrikes, and forming the family Dicrurinæ. The logger-head shrike inhabits the Gulf States; the white-rumped and white-winged shrikes are inhabitants of the Western States.

Shrimp, the name applied to many small crustaceans, and especially to the *Crangon vulgāris* or common shrimp, which belongs to the order Decapoda (ten-footed crustacea) and to the suborder Macroura (long-tailed)

The common shrimp reaches a size of about 2½ inches, and is common on both coasts of North America and also on those of Europe. It burrows in the sand and in Europe is caught for the market by means of a bag-net placed transversely on a pole, which is pushed through the sand at a depth of about 1½ or 2 feet. When alive it is of a light-brown or almost white color, resembling that of the sand in which it lives, but after boiling it assumes the well-known brown color. The *Pandălus annulicornis*, or red shrimp, inhabits deeper water than the common shrimp, and is not nearly so abundant. It is taken for the market chiefly on the east and south coasts of England, but occurs also in Scotland and Ireland. It reaches a size of from 2 to 2½ inches. When alive it is of a reddish-gray, with spots of deeper red; after boiling it is of a uniform deep red. This species is sometimes confounded with the common prawn; but it never reaches the size of the prawn, which, when adult, is above 4 inches in length. Belonging to the crustacean order Amphipoda, and allied to the sand-hoppers, we find the so-called 'fresh-water shrimp' (*Gammărus pulex*) of streams and brooks, distinguished as a genus by the slender upper antennæ, by the tufts of spines on the tail, and by the first and second pairs of legs possessing small nippers. The name 'shrimp' has been applied to this form from its rough resemblance to the familiar marine shrimps. In the United States shrimps are chiefly used as bait by anglers.



Common Shrimp, male (*Crangon vulgăris*).

Shrine (shrīn), originally a reliquary, or some kind of receptacle, for holding the bones or other relics of saints. Sometimes shrines were merely small boxes with raised tops like roofs; sometimes actual models of churches; sometimes the tombs or mausoleums of saints — large constructions, like that of Edward the Confessor at Westminster. Many were (and are) ornamented with gold, precious stones, or inlaid work; and among Roman Catholics some shrines are still objects of pilgrimage.

Portable Shrine, Malmesbury Abbey.

Shropshire (shrop'sher), or SALOP, a west inland county of England, on the border of Wales. Area, about 1343 sq. miles. The county is divided into nearly equal portions by the Severn, running southeast; the northern is generally level; the southern is more hilly. Shropshire is a fine agricultural and pastoral region and has considerable mineral wealth, including coal, iron and lead. The coal fields are extensive. The county is famous for its breed of sheep. A good deal of cheese is made, and large flocks of turkeys are raised. The manufactures include that of iron to a very great extent, chinaware, carpets, gloves, and flannel. Pop. 246,306.

Shrouds, a range of large ropes extended from the heads of the lower masts to both sides of a ship to support the masts, and named, from the masts to which they belong, the main, fore, and mizzen shrouds. Topmast, topgallant, and bowsprit shrouds are all similar in their object.

Shrove-Tuesday, the day before the first day of Lent or Ash-Wednesday, so called as a day on which confession was specially made and 'shrift' received. (See *Carnival* and *Lent*.) It was formerly a day of considerable festivity, and from the common practice of eating pancakes then the day came to be called *Pancake Tuesday*.

Shrub, a liqueur, consisting of lime or lemon juice and syrup, with the addition of rum or other spirit. It is made chiefly in the West Indies.

Shrubs, plants in which the perennial portion forms the greater part, which branch near the base, which are taller than bushes but not so tall as trees, seldom exceeding the height of a man. For practical purposes shrubs are divided into the deciduous and evergreen kinds. Among ornamental shrubs the best known are those belonging to the

genera *Rosa*, *Ribes*, *Rhododendron*, *Azalea*, etc. Among evergreen shrubs are the box, the laurel and various heaths.

Shumla (shöm'lȧ), a fortified town of Bulgaria, 50 miles west of Varna. Inclosed on the north and west by hills which form a natural rampart, strongly fortified, and with roads leading northward to Rustchuk and Silistria, southward to the passes of the Balkans, and eastward to Varna, Shumla is one of the most important military positions in the Balkan Peninsula. Pop. (1906) 22,290.

Shusha (shö-sȧ'), a town of Asiatic Russia, in Transcaucasia, in the government of Elisabethpol, 230 miles southeast of Tiflis, on an isolated rocky eminence nearly 4000 feet high. Shusha was formerly a fortress, and the capital of the khanate of Karabagh, annexed to Russia in 1822. Pop. 25,656.

Shushan. See *Susa.*

Shuster (shös'ter), a town of Persia, in the province of Khuzistan, on the Karun, 170 miles west by south of Ispahan. Once a flourishing provincial capital of Persia, it is now rising into importance again owing to its position on the Karun. That river is well adapted for steam navigation from its mouth to the neighborhood of this place, from which the land journey to Ispahan is 200 miles shorter than from Bushire. Pop. about 15,000.

Shuster, WILLIAM MORGAN, Persian official, was born at Washington, District of Columbia, in 1877. He took a partial course in Columbia College and Law School, was in the War Department in 1898, and in 1899 was sent to Cuba to adjust its finances. He afterwards filled government positions in Porto Rico, China, and the Philippine Islands, being made a Philippine commissioner in 1906. In April, 1910, in response to a request from the Persian government, he was sent to that country to fill the post of treasurer-general. This he did with exceptional ability, straightening out its tangled finances and greatly improving its financial condition. His attempt to seize the property of the deposed Shah for public purposes led to vigorous opposition from Russia, invasion of the country was threatened, and in response to Russia's demand Persia was obliged, in December, 1911, to dismiss its efficient and popular treasurer-general.

Shutar Gardan (shö'tur gur-dun'), a mountain pass in Afghanistan, connecting the Kuram and Logar valleys. The ascent from the Indian side is slight, but the descent into the Logar Valley is long and very steep. The pass commands the road to Kabul, and the possession of it in 1879 enabled General Roberts to advance on that city and occupy it almost without opposition.

Shut-in Society, an organization in the United States founded for the purpose of brightening the lives of persons in sickness by providing various objects which they would otherwise be unable to obtain. The members of local societies, besides supplying their sick members with fruit, flowers, reading material, medicines, and nourishing food, also undertake to supply easy chairs and other helps to convalescents.

Shuttle (shut'l), the instrument used to carry the weft-thread in weaving.

Shuya (shö'yȧ), a town of Russia, in the government of Vladimir, 68 miles N. E. of Vladimir, on the navigable Teza. It is one of the centers of the cotton industry of middle Russia. Pop. 18,968.

Sialidæ (sī-al'i-dē), a group of neuropterous insects, with very large anterior wings, which frequent the neighborhood of water. *Sialis lutaria* is a well-known member of this group, being used as a bait by anglers.

Sialkot. See *Sealkote.*

Sialogogues (sī-al'u-gogz), in medicine, drugs which cause an increased secretion of saliva, as pyrethrum, the various preparations of mercury, cubebs, etc.

Siam (sī-am', or sē-äm'), a kingdom embracing a great part of the Indo-Chinese Peninsula and part of the Malay Peninsula, and lying between Burmah on the west, and Anam and Cambodia on the east and southeast. Its boundaries are ill-defined on the north and northeast, but its area is estimated at about 220,000 square miles, and its population at about 6,230,000, including 2,000,000 Siamese, 2,000,000 Laotians, 1,000,000 Chinese, and 1,000,000 Malays. A large part of the territory is not well known. Siam proper consists mainly of the low-lying alluvial basin of the Menam and its numerous tributaries, which flows southward into the Gulf of Siam, forming an extensive and intricate delta, on which is situated Bangkok, the capital. This alluvial plain, intersected by numerous streams and canals, is extremely fertile, producing magnificent crops of rice, sugar, cotton, maize, and indigo. Both sides of the Menam basin are skirted by densely-wooded ranges of hills, forming the water-

partings towards the Salwin and Mekong, the latter of which is the great river of Eastern Siam. The minerals include gold, tin, iron, copper, lead, zinc, and antimony, besides several precious stones, such as the sapphire, oriental ruby, and oriental topaz. Mining is chiefly in the hands of the Chinese. Much of Upper Siam seems incapable of being cultivated. During the dry season, which lasts from November to May, there is an utter absence of rain in this region, which again is so flooded by rain during the wet season as to be converted into a vast swampy forest. Cocoa and areca palms are numerous in Siam; fruits are abundant and of excellent quality; black pepper, tobacco, cardamoms, and gamboge are important products. The forests produce aloes-wood, sappan-wood, teak-timber, bamboos, rattans, gutta-percha, dammar, catechu, benzoin, etc. Among wild animals are the tiger, leopard, bear, otter, ourang-outang, single-horned rhinoceros, and elephant, which here attains a size and beauty elsewhere unknown. The last, when of a white color, is held in the highest reverence. The forests abound with peacocks, pheasants, and pigeons; and in the islands are large flocks of the swallows that produce the famed edible birds'-nests. Crocodiles, geckoes, and other kinds of lizards, tortoises, and green-turtles are numerous. The python serpent attains an immense size, and there are many species of snakes.

Commerce.— Nearly the whole of the trade of Siam is in the hands of foreigners, and the foreign trade centers at Bangkok. The chief export is rice, after which come teak, pepper, dried fish, birds'-nests, cattle, and teel seed. The chief imports are gold-leaf and cotton fabrics, after which come opium, china goods, gunny bags, hardware, kerosene-oil, and silk goods. The trade is chiefly with Hong-Kong and Singapore, and (to a much less extent) with Lower Burmah and Great Britain.

People.— The Siamese are members of the great Mongolian family, and of the same race as the people of Burmah and Anam. In stature they do not average more than 5 feet 3 inches in height; they have a lighter-colored skin than the western Asiatics, but darker than the Chinese. They are generally vain, indolent, superstitious, and cowardly, but polite, kind-hearted, and tolerant. Elementary education is general, most of the Siamese being able to read and write. Among the higher classes European manners and customs are gaining admission, including European dress. The houses are mostly constructed of timber and bamboo, and in localities subject to inundation are raised on piles. The Siamese profess Buddhism, introduced into the country about the middle of the seventh century. Christianity is now making some progress in the country. Some of the temples are large and elaborate structures, richly decorated. The language forms a connecting link between the Chinese and Malay. The written characters seem to be derived from a form of Sanskrit. The literature is meager, uninteresting, and in point of imagination and force of expression much below the Arabic, Persian, or Hindustani. The literary language has been much influenced by Pali and Sanskrit. The language of the chief Buddhist works is Pali. The printing-press has been introduced in recent years, and many of the best Siamese works can now be had in a printed form.

Government.— The legislative power is exercised by the king in conjunction with a council of ministers. The royal revenue, estimated at $10,000,000 a year, is raised by the land-tax, and by taxes on fruit-trees, spirits, opium, gambling, customs, tin-mines, edible birds'-nests, and fisheries. There is a small standing army, officered to some extent by Europeans, and a general armament of the people, in the form of a militia. There are about 40 provinces, each administered by a governor.

History.— Siam appears to have no place in history prior to A. D. 638, and the credible records go back only to 1350, the date of the foundation of Ayuthia, the old capital. The Portuguese established intercourse with Siam in 1511, but in the seventeenth century were gradually supplanted by the Dutch. English traders were in Siam very early in the seventeenth century, but in consequence of a massacre their factory at Ayuthia was abandoned in 1688. The French were expelled about the same time, and the trade was neglected until 1856, when Sir J. Bowring's treaty again opened up Siam to Europeans. Since that date western ideas of civilization have been introduced to some extent, and a few of the Siamese youth are now sent to Europe for their education. The recent king, Chulalonkorn I, was born in 1853, and succeeded his father in 1868. Like his father he had an education in English, and was alive to the advantages to be obtained by adopting European inventions and discoveries. He died Oct. 3, 1910, and was succeeded by his son Vagiravudh. In 1893 France acquired possession of the eastern bank of the Mekong river as far north as the 23d parallel, including the river islands. This act on the part of

France greatly reduced the area of Siam. In 1917 it declared war against Germany.

Siamang (sī'a-mang; *Siamanga* or *Hylobătes syndactylus*), one of the higher anthropoid or man-like apes. This animal inhabits Sumatra. It averages about 3 feet in height.

Siamese Twins, the best-known example of two human beings having their bodies connected inseparably from their birth, being joined by a thick fleshy ligament from the lower end of the breast-bone of each, having the common navel on its lower border, so that they stood in a sort of oblique position towards each other. Born in Siam in 1811, of a Chinese father and a Chino-Siamese mother, and named Eng ('right') and Chang ('left'), they were brought to the United States in 1829. They were on exhibition in Europe and America a number of times, and ultimately settled in the State of North Carolina. They married two sisters and had large families of children, none of whom exhibited any malformation. Chang received a paralytic stroke in 1870, and three years later was affected with an inflammatory disease of the respiratory organs. He died unexpectedly (Jan. 17, 1874) while his brother was asleep, and Eng died a few hours afterwards. The Siamese twins attracted great attention during their lifetime, particularly from physiologists and medical men, some of whom thought that the ligament connecting them might have been cut without causing the death of either.

Sibbald (sib'ăld), Sir Robert, a Scottish physician and naturalist, born in 1641, was educated at Edinburgh, Leyden and Paris, and settled in Edinburgh as a physician in 1662. He was the first professor of medicine in the University of Edinburgh, took a leading part in establishing the Royal College of Physicians and was its first president. He was also one of the founders of the botanic garden, and the author of numerous pamphlets and treatises on medicine, botany, zoölogy, and Scottish antiquities. In 1682, in recognition of his eminence in science and medicine, he was knighted by the Duke of York, then high commissioner in Scotland. He died in 1712.

Sibbaldia (sib-al'di-a), a genus of dwarf evergreen plants, nat. order Rosaceæ, named after Sir Robert Sibbald (above). *S. procumbens* has trifoliate leaves and heads of small yellowish flowers. It is found on the summits of the mountains in Vermont, as well as in similar localities from Canada to Greenland.

Siberia (sī-bē'ri-a), a great division of the Russian dominions. It occupies all North Asia, stretching uninterruptedly eastward from the Ural Mountains to the Pacific Ocean, and southwards from the Arctic Ocean to the Chinese dominions and Russian Central Asia. It has a total area of about 4,800,000 square miles, with a population of about 6,740,600, and is divided into the governor-generalships of Western Siberia, Eastern Siberia, and the Amur region; Western Siberia, including the governments of Tobolsk and Tomsk; Eastern Siberia, including the governments of Yeniseisk and Irkutsk and the provinces of Yakutsk and Transbaikalia; and the Amur region, including the province of Amur and the Maritime Province or Primorskaya. A region of such vast extent has naturally a very diversified configuration; but generally speaking Siberia may be considered as a vast inclined plane sloping gradually from the Altai, Sayan, and Yablonoi Mountains on the south to the Arctic Ocean on the north. In the east it is traversed in different directions by several mountain ranges, but elsewhere it is almost unbroken by any greater heights than a few hills. It is drained chiefly by the Obi (2120 miles), with its great tributary, the Irtish (2520 miles), the Yenisei, and the Lena (3000 miles), all of which pursue a northerly course to the Arctic Ocean; and by the Amur (2700 miles, 2400 of which are navigable), which flows in an easterly and northeasterly direction to the Pacific. The principal lake is Lake Baikal, in the south, 400 miles long, 20 to 53 broad, and 1560 feet above sea-level. The chief islands are the New Siberia group in the Arctic Ocean, and the island of Saghalin, off the mouth of the Amur, in the Sea of Okhotsk, an arm of the Pacific. The coast-line is very extensive, but the Arctic Ocean is ice-bound at least ten months out of the twelve, and is almost valueless for commercial purposes, and the Sea of Okhotsk, on the Pacific, is infested with masses of floating ice and dense fogs. The principal ports are Vladivostock, on the Sea of Japan, the chief naval station of Russia on the Pacific; Okhotsk, on the Sea of Okhotsk; and Petropavlovsk, on the east coast of Kamchatka. Siberia enjoys a warm summer, but the winter is exceedingly severe. South Siberia has, in many parts, a very fertile soil, which yields rich crops of wheat, rye, oats, and potatoes; but immense tracts of Siberia are utterly unfit for tillage, more particularly the *tundras* or great stretches of boggy country along the Arctic Ocean. In the west are extensive steppes.

Roughly speaking, the northern limits of agriculture are 60° N. lat. Cattle-breeding and bee-keeping are largely pursued. Hunting and fishing are also sources of remuneration, ermines, sables, and other fur-bearing animals being numerous. The wild animals include the elk, reindeer, and other deer, bear, wolf, white and blue fox, lynx, etc. The forests are extensive and valuable, the forest belt, continuous with that of Russia, being perhaps the largest extent of forest land in the world, with the exception of the Amazonian forest. The trees consist of pine, spruce, oak, maple, beech, birch, poplar, etc. Manufactures and mining are in a backward state, though Siberia has very considerable mineral wealth. Large quantities of gold are obtained, as well as silver, platinum, lead, iron, coal, etc. The trade is mainly with Russia, the foreign trade being insignificant. The chief towns are Irkutsk, capital of Eastern Siberia and a trading city; Tomsk, capital of gov. Tomsk, a trading city, with a university; Tobolsk, capital of Western Siberia; Omsk, and Vladivostock. Yermak, a Cossack adventurer, entered Western Siberia in 1580, and made a rapid conquest of the western portion of the country, which he handed over to Ivan the Terrible of Russia. Bands of hunters and adventurers then made their way across the Urals, attracted by the furs, and gradually penetrated to the Arctic Ocean and the Pacific. The latest acquisitions by Russia were the Amur territory, and coast regions of Manchuria, ceded by China in 1858 and 1860, but further progress in that section of Asia was checked by the war with Japan in 1904-05. Prior to the European war, 1914-18, Siberia was used as a place of exile, and thither were sent the men and women who opposed the Czarist government. These political offenders were at first kept under restraint, but gradually were permitted considerable liberty, and many of them settled in Siberia and so well did they develop the land that many enterprising tenants were attracted. This northward trek was stimulated by the building of the Trans-Siberian Railroad, giving communication, without change, from Petrograd to Vladivostok and Port Arthur, its full length being over 5600 miles. The Siberians objected to the Bolsheviki (q. v.) form of government, established by Lenine at Moscow, and at the end of 1918 set up a separate government, with headquarters at Omsk. In their struggle with the Bolsheviki they were aided by the Czecho-Slovaks, and by American and Allied troops who were landed in the country.

Sibi (sē-bē′), a district of Southern Afghanistan, ceded to the British by the terms of the treaty of Gandamak in 1881; pop. 74,555. Its administration is carried on under the control of the governor-general's agent in Baluchistan. The town of Sibi has developed very largely since the cession, and especially since the opening of the Sind-Pishin Railway, on which it is a station. Pop. 4551.

Sibságar (sēb-sä′gur), chief town of Sibságar District, Assam Province, India, on the navigable Dikhu, 9 miles south of the Brahmaputra. It is the seat of some river trade, and has exports of cotton, rice, and, above all, of tea, Sibságar District ranking as the first tea-growing district in Assam proper. Pop. 5868.— The district, which is mostly a level plain intersected by tributaries of the Brahmaputra; area, 4996 square miles. Pop. 597,969.

Sibutu. See *Cagayan.*

Sibyl (sib′il), the name common to certain women mentioned by Greek and Roman writers, and said to be endowed with a prophetic spirit. Their number is variously stated, but is generally given as ten. Of these the most celebrated was the Cumæan sibyl (from Cumæ in Campania). She is said to have written in Greek verses the collection of prophecies famous under the name of Sibylline books, and containing the *fata urbis Romæ*, which she offered to Tarquin the Proud for sale. When the king, on account of the high price asked, refused to buy them, she threw three of the books into the fire, and on a second refusal three more, after which the king, alarmed, paid for the three remaining the price originally asked for the whole. These books were preserved in the temple of Jupiter Capitolinus, and were consulted on occasions of national danger. In 83 B.C. they were destroyed by fire along with the temple, and the senate sent delegates to the Italian and Greek cities, especially to Erythræ, to collect whatever Sibylline verses they could find; and after the rejection of those which were considered spurious, about 1000 of them were retained, and preserved in the new temple of Jupiter Capitolinus. This collection of Sibylline oracles seems to have been burned by Stilicho shortly after 400 A.D. The so-called Sibylline oracles which have come down to modern times are of Jewish or Christian origin, dating from about 170 B.C. to 700 A.D.

Sicard (sē-kär), ROCH-AMBROISE CUCURRON, famous in the history of the education of deaf-mutes, was born in 1742 near Toulouse, entered into holy

orders, and was sent by the Archbishop of Bordeaux to Paris to study the method of the Abbé de l'Epée for the instruction of deaf-mutes. He became, in 1786, director of the school for deaf-mutes established by the Archbishop of Bordeaux in the city of that name, whence, in 1789, he removed to Paris as successor to the Abbé de l'Epée, in whose system he had made some important improvements. He also wrote several works on the instruction of deaf-mutes. During the revolution he narrowly escaped with his life; and under the Directory it was only by concealing himself that he was enabled to avoid the consequences of a sentence of exile pronounced against him. He died in 1822.

Sicca (sik'a), an Indian jeweler's weight of about 180 grains troy. The Sicca rupee, formerly current in India, contained about 176 grains of pure silver, and was equal to about 52 cents.

Sicilian Vespers (si-sil'yan), the name given to the outbreak of the insurrection in Sicily in 1282 against the French. Charles of Anjou (see next article) had established himself, through the favor of the pope, in possession of the Two Sicilies. He ruled with great severity, and the oppressed people applied in vain for relief to the pope. Giovanni di Procida, a nobleman of Salerno, went to Aragon, and invited King Pedro, whose wife, Constantia, was a daughter of the former king, Manfred, to undertake the conquest of Sicily. Pedro embraced his proposals, and on March 30, 1282, at the hour of vespers on Easter Monday, the inhabitants of Palermo flew to arms and fell upon the French, who were all massacred. Before the end of April Messina and other towns followed the example of Palermo, and the Sicilian Vespers ended in the overthrow of the domination of Charles of Anjou and the establishment of the Aragonese dynasty.

Sicilies (sis'i-lez), KINGDOM OF THE TWO, a former kingdom of Italy, consisting of Naples (or South Italy) and Sicily. In 1047, while Greeks and Saracens were struggling for the possession of Lower Italy and Sicily, the twelve sons of Tancred de Hauteville, a count in Lower Normandy, came in with their followers. Robert Guiscard, one of these brothers, subdued Apulia and Calabria, taking the title of duke, and his youngest brother, Count Roger, conquered Sicily. Roger's son and successor, Roger II, completed the conquest of all Lower Italy by subduing Capua, Amalfi, and Naples, at that time celebrated commercial republics, and in 1130 took the title of king, calling his kingdom the Kingdom of the Two Sicilies. In 1189 the race of Tancred became extinct, and the German emperor, Henry VI, of the house of Hohenstaufen, claimed the kingdom in right of his wife, Constantia, the daughter of Roger II. The kingdom remained with the family of Hohenstaufen until 1266, when Pope Urban IV, feudal overlord, bestowed it upon Charles of Anjou, brother of Louis IX of France, who caused the legitimate heir, Conradin of Suabia (1268), to be beheaded. Sicily, however, freed herself in 1282 from the oppressions of the French (see *Sicilian Vespers*) by the aid of King Pedro of Aragon, and Naples was now separated from it, Sicily being under the Kings of Aragon, while Naples was under the Angevin dynasty. This dynasty was dispossessed in 1442 by Philip V of Aragon, who bestowed Naples on his natural son, Ferdinand. In 1504 Sicily was again united to Naples under the Spanish crown, and governed by viceroys until 1713, when the Peace of Utrecht again divided the Two Sicilies, Naples falling to Archduke Charles of Austria, Sicily to Duke Victor Amadeus of Savoy. King Philip V of Spain reconquered Sicily in 1718, at the instigation of Alberoni, but was forced to cede it to Austria in 1720, Savoy receiving Sardinia in exchange, by which means the Two Sicilies became a part of the Austrian dominions. In 1734 the Spanish Infante Don Carlos, son of Philip V, at the head of an army invaded Naples, conquered both the continental and the insular part of the kingdom, and was crowned at Palermo in 1735 as Charles IV. This change was sanctioned by the Treaty of Vienna (1738), and till 1860 this line of the Bourbon family maintained possession of the Two Sicilies, except for a few years during the Napoleonic period, when Joseph Bonaparte and Joachim Murat reigned on the mainland as kings of Naples. In 1759, when Charles IV ascended the Spanish throne under the name of Charles III, he conferred the Kingdom of the Two Sicilies on his third son, Ferdinand, and decreed at the same time that it should never again be united to the Spanish monarchy. The reign of Ferdinand extended through the stormy period of the French revolution and the subsequent European commotions. (See *Ferdinand I.*) His successors, Francis I, Ferdinand II (Bomba), and Francis II were despotic tyrants who forced the people into periodic revolt, put down with much severity. In 1860, however, an insurrection broke out in Sicily, and an expedition of volunteers from Piedmont and other Italian prov-

inces under Garibaldi sailed from Genoa to the assistance of the insurgents. The result was that the Neapolitan troops were driven from the island. Garibaldi, following up his success, crossed over to the mainland, where he met little or no opposition; Francis II fled from Naples; the strong places in his hands were reduced; and by a popular vote the Kingdom of the Two Sicilies ceased to exist as such, and became an integral part of the Kingdom of Italy. See *Italy*.

Sicily (sis'i-li), the largest island of the Mediterranean, belonging to Italy, from the southwestern extremity of which it is separated by the narrow strait of Messina, about 2 miles wide; area about 9700 sq. miles, divided into seven provinces; pop. about 3,700,000. It is triangular in shape, ending in the three capes of Faro on the N. E., Passaro on the S., and Boeo on the W.; whence the ancient poetical name of Trinacria. The north and east coasts are steep and cliffy, and are provided with good harbors, the finest being that of Palermo; the south and west coasts are flatter and less indented. The greater part of the surface consists of a plateau of varying elevation. Considerable mountains occur in the north, beginning at the northeastern extremity of the island, where they are evidently a continuation of the mountains on the other side of the Strait of Messina. They reach heights varying from 4000 to 6000 feet. The lower slopes of these mountains are clothed with olive-yards and orange-groves, mulberry gardens and vineyards, and their higher slopes with forests of oak and chestnut. The highest elevation in Sicily is the active volcano of Etna, in the east of the island, which rises to a height of 10,874 feet. (See *Etna*.) To the south of Etna, on the east coast, is the plain of Catania, the only plain of any great extent. It is watered by the Simeto. The principal perennial streams, besides the Simeto, are the Salso, Platani, and Belice. The climate, as in the other regions of the Mediterranean, is mild and equable, but its salubrity is impaired by the sirocco, and, locally, by the occurrence of malaria. The soil is very fertile. Three-fourths of the cultivated surface are covered with cereals, chiefly wheat, though oats and barley are also grown. Cotton, sugar, and tobacco are also cultivated to some extent. Fruits of every variety are extensively grown, including large quantities of oranges and lemons. The vine flourishes almost everywhere, and much wine is produced. The chief exports are fruits, wine, and sulphur, besides olive-oil, sumach, cream of tartar, etc. Sicilian sulphur is extensively exported, the center of this trade being Girgenti, on the south coast. Tunny and sardine fisheries are carried on round the coast. Manufactures are but little developed. The chief seats of foreign commerce are the three principal towns, Palermo, Messina, and Catania. The system of roads and railways is still defective. Agriculture is generally carried on in a very primitive manner, and the rural populations are in a very rude and debased condition. Education is extremely backward; life and property are by no means secure, and brigandage still exists, as well as the custom of the vendetta.— At the dawn of history the older races inhabiting Sicily, the Iberian Sicani, from Iberia (Spain), and the Siculi from Italy, were hemmed in by Phœnician and Greek colonies. The Greeks, who entered the island in the eighth century B.C., founded the great cities of Syracuse, Agrigentum, and Messina, drove the Phœnicians to the northwest coast, and spread their influence and culture over the whole island. Greek art and literature here flourished, and many Greek names of distinction are connected with Sicily. The Carthaginians subsequently took the place of their kinsmen, the Phœnicians, and between them and the Greeks a struggle ensued, which ended in favor of the latter (480 B.C.). War with the Carthaginians (1st Punic war) brought the Romans to Sicily, and having acquired the Carthaginian portion of the island (241 B.C.) they extended their rule over the whole, Sicily becoming a Roman province in 212 B.C. On the decline of the Roman Empire the island was overrun by the Goths, who retained possession till A.D. 551, when Sicily became part of the Byzantine Empire. In the beginning of the ninth century the Saracens became masters, and continued so till their expulsion by the Normans in the eleventh century, who remained long enough in possession to establish the feudal system in all its rigor. For a continuation of the history of Sicily see *Sicilies* (*Kingdom of the Two*). The most important recent event on the island was the earthquake of Dec. 28, 1908, which destroyed the flourishing city of Messina with about 100,000 of its population. The ruined city is gradually being rebuilt.

Sickingen (zik'ing-en), FRANZ VON, a famous German knight of large possessions in the Rhine valley, was born in 1481, and from early youth devoted himself to the military life. He aided the emperors Maximilian I and Charles V in their wars, engaged in repeated private feuds of his own; gained

great renown as a protector of the poor and oppressed; was a friend of the Humanists and Reformers, and under the influence of Ulrich von Hutten, formed a scheme to carry through the Reformation by force, and abolish the ecclesiastical principalities. He began the war by an attack on the Archbishop of Treves, but was assailed by the landgrave of Hesse and the count palatine of the Rhine, and at last he was compelled to surrender, mortally wounded, together with his last castle, Landstuhl, near Kaiserslautern. He died the day after the capitulation, May 7, 1523.

Sickle (sik'l), a reaping-hook; a curved blade of steel with a handle, and having the edge of the blade in the hollow of the curve, used for cutting grain and the like. The sickle has been mostly superseded by the scythe, and the scythe in turn has given place to the mowing- and reaping-machines.

Sickles, Daniel Edgar, soldier, born in New York city in 1825. He studied law, and was elected to Congress on the Democratic ticket in 1856. In 1859 he killed Philip Barton Key for illicit relations with his wife; was tried, and acquitted through the force of public sympathy after a trial lasting twenty days. He entered the army during the Civil War and was made successively brigadier-general and major-general of volunteers, commanding a brigade in the battles around Richmond, a division at Antietam, and a corps at Chancellorsville. He commanded the third corps at Gettysburg and lost a leg in the battle of July 2, 1863. In 1867 he was made commander of the second military district, comprising North and South Carolina. He was appointed minister to Spain in 1869, and since then was president of the New York Civil Service Board, sheriff of New York and member of Congress. He died May 2, 1914.

Siculi (sic'u-li), an ancient Sicilian tribe that occupied the eastern half of the island of Sicily.

Sicyon (sis'i-on), a city of ancient Greece, in the northern part of the Peloponnesus, 9 miles from Corinth, and near the Gulf of Corinth, on which it had a port. Sicyon was celebrated for its schools of sculpture and painting. At first dependent upon Argos, it was afterwards closely allied to Sparta, which it aided in the Peloponnesian War. Under Aratus (251 B.C.) it became one of the most important cities of the Achæan league, of which it finally shared the fate, falling under the dominion of Rome. In the second century A.D. it was almost depopulated

Sida (sē'da), a genus of herbs and shrubs, nat. order Malvaceæ, the numerous species of which are extensively distributed throughout the warm parts of the world. Like all malvaceous plants they abound in mucilage, and some species are employed in medicine, especially in India, while others have tough ligneous fibers which are used for cordage in various countries.

Siddons (sid'unz), Sarah, daughter of Roger Kemble, the manager of an itinerant company of players, was born at Brecon, South Wales, in 1755. She commenced her theatrical career when quite a child, and in her nineteenth year was married to William Siddons, an actor in her father's company. In 1774 she met with the first recognition of her great powers as an actress at Cheltenham in consequence of her representation of *Belvidera* in *Venice Preserved.* Her success at Cheltenham procured for her an engagement at Drury Lane, but her first appearance there was a comparative failure, and in 1777 she again went on circuit in the provinces. Her second appearance at Drury Lane took place October 10, 1782, in the character of *Isabella* in the *Fatal Marriage.* Her success was complete, and she was universally acknowledged to be the first tragic actress of the English stage. For thirty years she continued to astonish and enchant the lovers of the drama, and having acquired an ample fortune, she took her leave of the stage in 1812. Her greatest characters were *Queen Catharine* in *Henry VIII,* and *Lady Macbeth.* In her art she was a close and systematic student, while in private life she enjoyed the respect of all who knew her. She died June 8, 1831.

Sidereal System. See *Stars.*

Sidereal Time (sī-dē're-al), time measured by the apparent motion of the stars. A *sidereal day* is the time from the passage of a star across the meridian till its next passage, and is exactly the period of the revolution of the earth on its axis. It is the most constant unit of time which we possess. Its length is 23 hours 56 minutes 4.098 seconds. A *sidereal year* is the period in which the fixed stars apparently complete a revolution and come to the same point in the heavens, and is the exact period of the revolution of the earth round the sun. There are thus 365 days, 6 hours, 9 minutes, 9.5 seconds in a sidereal year. See *Day.*

Siderite (sid'er-it), in mineralogy, an important iron ore, also called spathic iron ore. See *Iron.*

Sideroxylon. See *Iron-wood.*

Sidgwick (sidj'wik), HENRY, writer on moral philosophy, was born at Skipton, Yorkshire, in 1838, was educated at Rugby and Trinity College, Cambridge, and became a fellow and lecturer of his college in 1859. In 1875 he was appointed prælector of moral philosophy in Trinity College, and in 1883 Knightbridge professor of moral philosophy in the university. His works include *Methods of Ethics* (1874), *Principles of Political Economy* (1883), and *Outlines of the History of Ethics* (1883). He died September 26, 1900.

Sidi-Bel-Abbès (sē'dē-bel-äb-bās'), a fortified town of Algeria, in the department of Oran, 48 miles by rail south of Oran, on the Mekerra, in a healthy, fertile, and populous plain. It is a town of comparatively recent origin. Alfalfa, grain, wine and tobacco are exported. Pop. 30.942.

Sidmouth, VISCOUNT. See *Addington.*

Sidney (sid'ni), a city, county seat of Shelby Co., Ohio, 42 miles N. of Dayton, on the Miami River and the Miami & Erie Canal. It is a manufacturing center, producing steel scrapers, electric washers, machine tools, automobile bodies, aluminum ware, vacuum cleaners, knit goods, etc. Pop. (1920) 8590.

Sidney, or SYDNEY, ALGERNON, second son of Robert, second earl of Leicester, and of Dorothy Percy, daughter of Henry, earl of Northumberland, was born at Penshurst, Kent, in 1622. He accompanied his father in his embassies to Denmark and France. He was also early trained to a military life, and served with some distinction in Ireland, where his father was lord-lieutenant. In 1643 he returned to England, and joined the parliamentary forces. In 1644 he was lieutenant-colonel of a regiment of horse in Manchester's army, and was severely wounded at Marston Moor. In 1645 he was given the command of a cavalry regiment in Cromwell's division of Fairfax's army, and was returned to parliament for Cardiff. He was nominated one of the commissioners to try Charles I, but took no part in the trial, although he approved of the sentence. He refused all concurrence in the government of Cromwell, retiring to Penshurst, but when the return of the Long Parliament in May, 1659, gave expectations of the establishment of a republic, he again took his seat, and was nominated one of the council of state. He was soon after appointed a commissioner to mediate a peace between Denmark and Sweden, and while he was engaged in this embassy the Restoration took place. Conscious of the offense he had given the royal party, he refused to return, and remained an exile for seventeen years. At length, in 1677, the influence of his friends procured him permission to return to England. After the death of Shaftesbury, in 1682, he entered into the conferences held between Monmouth, Russell, Essex, Hampden, and others, and on the discovery of the Rye House Plot he was arrested and sent to the Tower on a charge of high treason. He was tried before the notorious Chief-justice Jeffreys, and his trial was conducted with a shameless absence of equity which has conferred upon him all the glory of a martyr. He was executed on Tower Hill, December 7, 1683. Parliament about 1690 declared his sentence unjust. His *Discourses Concerning Government* were first printed in 1698.

Sidney, SIR PHILIP, one of the most conspicuous figures at the court of Queen Elizabeth, was the son of Sir Henry Sidney of Penshurst, Kent, where he was born Nov. 29, 1554. He became a favorite with the queen, who in 1577 sent him on an embassy to Germany. In 1583 he married Frances, daughter of Sir Francis Walsingham, and the same year he received the honor of knighthood. In 1585 he went to the Netherlands with his uncle Dudley, earl of Leicester, who commanded the forces sent to assist the Dutch against the Spaniards, and he was appointed governor of Flushing and general of horse, but at Zutphen, Sept. 22, 1586, he was mortally wounded, and died at Arnheim, Oct. 7. He was a man of versatile gifts, and made his mark in many ways. He was a soldier and statesman of great promise, and his contributions to literature, though not numerous, were of great importance. They include the *Lady of the May,* a masque, performed in 1578; *Arcadia* (1590), a romance in a medley of prose and verse in an Italian style then popular; *Astrophel and Stella* (1591), the first important body of sonnets in the English language; and the *Defense of Poesy,* first published in 1595 as an *Apologie for Poetrie.*

Sidon (sī'don), or ZIDON, a seaport of Syria, situated on the eastern coast of the Mediterranean, between Lebanon and the sea, about midway between Beyrout and Tyre, was long the principal city of Phœnicia (1600-1300 B.C.). Its artistic products were famous at an early period, as also its manufactures of glass, linen, purple dye, and perfumes, and in commercial enterprise it occupied a dis-

tinguished position. In the Persian, Grecian and Roman periods it was still great and populous, and even in the middle ages it was a place of considerable importance. During the crusades it was taken and retaken several times. It was almost completely destroyed during the troubles of the thirteenth century, but in the fifteenth it reappeared, under its modern name of Saida, as the port of Damascus. The trade is now unimportant. Pop. about 15,000.

Siebenbürgen (zē'ben-bür-gen). See *Transylvania.*

Siebengebirge (zē'bėn-ge-bir-gė; 'Seven Mountains'), a small mountain range of Germany, on the right bank of the Rhine, not far from Bonn. Seven mountains tower above the rest, of which the Drachenfels, close to the Rhine, and presenting a splendid view from the river, is the most beautiful. On all of them are ruins of ancient castles.

Siebold (zē'bolt), PHILIP FRANZ VON, scientific explorer of Japan, born at Würzburg, Germany, 1796; died 1866. He studied medicine, and entered the service of the king of the Netherlands as medical officer in the East Indian army, and on his arrival at Batavia was attached to a mission to Japan. His medical qualifications gained him the favor of the Japanese, and enabled him to collect a vast amount of information concerning that country, then so little known. On his return to Europe he published a number of valuable books on Japan, and founded the Japanese Museum at Munich.—His brother, KARL THEODOR SIEBOLD (1804-1885), published several standard works on zoology.

Siedlce (syed'l-tse), a town of Russian Poland, capital of the government of the same name, 57 miles E. S. E. of Warsaw, the seat of a bishop. Pop. 23,714.—The government of Siedlce, between the Vistula and the Bug, has an area of 5533 square miles, and a population (1906) of 907,700.

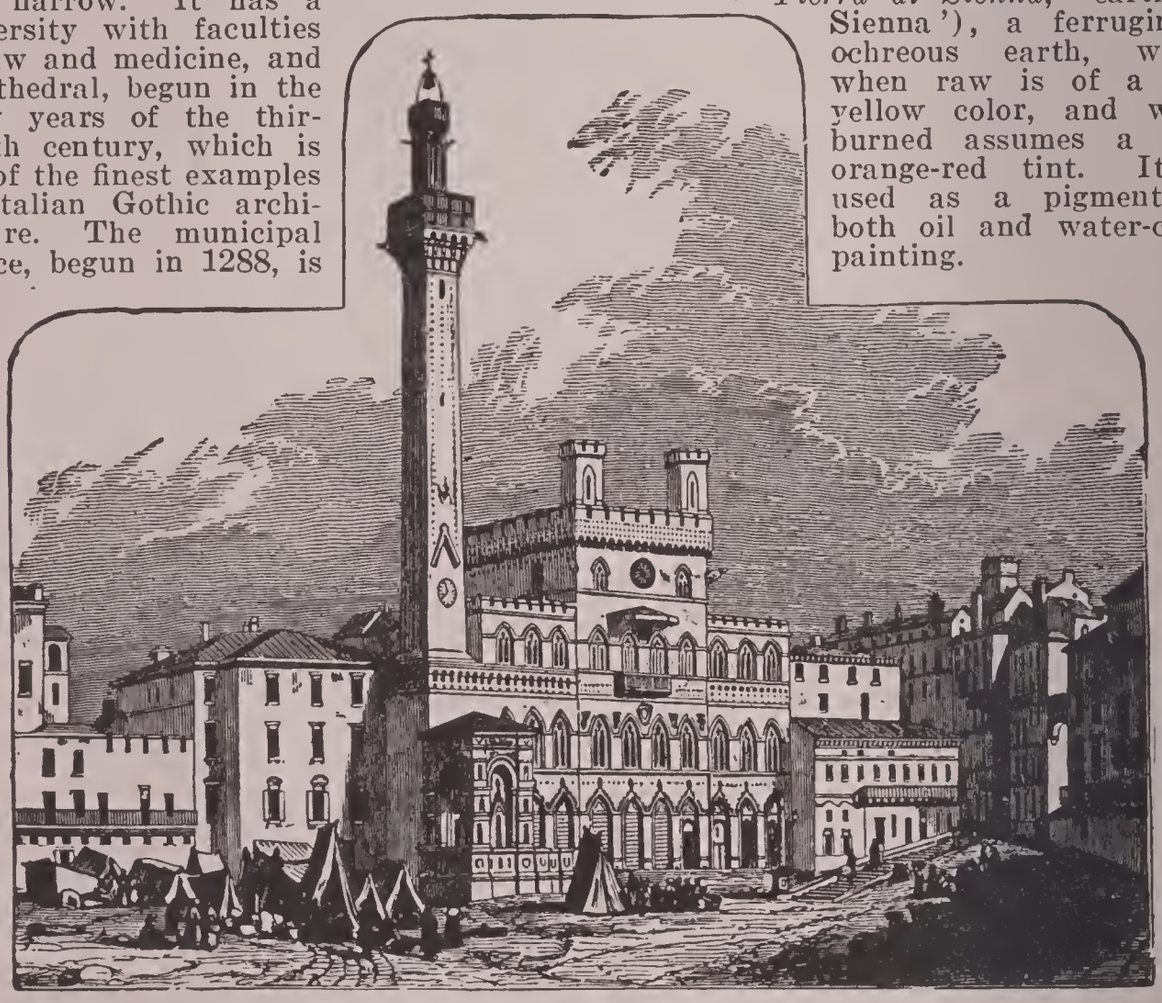
Siege (sēj), the surrounding or investment of a fortified place by an army with a view to its capture. The taking of a fortified place may be attempted (1) by surprise, (2) by a sudden onset, (3) by blockade out of gunshot (see *Blockade*), (4) by a siege, properly so called. In a regular siege the fortress is first blockaded, so as to cut off all intercourse from without, the besieging force encamping just beyond reach of the enemies' guns. Then if any detached works are situated before the fortress, their capture must be effected in order to admit the opening of the trenches. The trenches are formed in the direction of the fortress; but that they may not be enfiladed from thence they must proceed in a zigzag form. (See *Sap.*) For the protection of the workers trenches called *parallels*, because they run in a direction parallel or nearly so to the sides of the fortress, are dug at intervals. While the trenches are being opened, the besieged, by sallies and counter operations of every kind, strive to drive off the besiegers, and to destroy their work; and the besiegers make efforts to establish themselves more and more securely, to raise batteries, and then, by means of trenches and advanced parallels, to approach the walls of the fortress; and all the while the artillery is kept constantly playing from the batteries of the besiegers as well as from the works and guns of the besieged. From the last parallel, which approaches very near the fortress, the besiegers prepare to make breaches. Here likewise mining operations are carried on whenever they are found advisable. When at last the breaches are practicable the storming or scaling of the walls follows.

Siegen (zē'gėn), a town of Germany, in the Prussian province of Westphalia, on the Sieg, 47 miles east of Cologne. It is an ancient place, with manufactures of leather, paper, soap, linen, etc., while in the vicinity are numerous iron-mines and smelting furnaces. Pop. (1905) 25,201.

Siegfrid (sēg'frēd). See *Sigurd.*

Siemens (sē'mens) SIR CHARLES WILLIAM, engineer, born in Hanover, April 4, 1823, was educated at the gymnasium at Lübeck, the polytechnic school at Magdeburg, and the University of Göttingen. After a training in engineering and electricity in the workshops of Count Stolberg he migrated to London in 1843, and at a later date was joined by his brother (Werner), who took part in his various undertakings. The great works of Siemens Brothers at Charlton, West Woolwich, for the manufacture of submarine electric telegraph cables, were established in 1858; and the great steel-works at Landore, Swansea, in 1868. He labored mainly in two distinct fields, the applications of heat and the applications of electricity, and won a great reputation in both. He was knighted, April, 1883, in reward for his services, which had been previously recognized by numerous scientific societies, and by the Universities of Oxford, Glasgow, Dublin and Würzburg. He died at London in November, 1883, and his brother, Werner, in 1892.

Siena (sē-ā′nȧ), or SIENNA (anciently *Sena Julia*), a city of Central Italy, on three connected hills on the southern frontiers of Tuscany, 59 miles south of Florence, is surrounded by old walls, entered by nine gates, and has also a citadel; the streets are irregular, steep and narrow. It has a university with faculties of law and medicine, and a cathedral, begun in the early years of the thirteenth century, which is one of the finest examples of Italian Gothic architecture. The municipal palace, begun in 1288, is a fine specimen of Pointed Gothic. It stands in the historic Piazza del Campo, now the Piazza di Vittorio Emanuele, a large open semicircular space in the center of the city, and is adorned with frescoes of the Sienese school. The institute of fine arts contains a valuable collection of pictures of the older Sienese painters. There are various other buildings of interest, including churches and palaces. The manufactures are not of much importance. In the middle ages Siena gave its name to a school of painting, and was the birthplace of famous painters, sculptors and architects. It was long the powerful rival of Florence, but was annexed to Tuscany in 1557. Siena is the seat of an archbishop. Pop. 42,389.



Palazzo Pubblico or Municipal Buildings, Siena.

Sienkiewicz, HENRY, a Polish novelist, born in Lithuania in 1845. He produced a number of popular historical novels, including *Quo Vadis*, a story of imperial Rome; *The Deluge*, *Sword and Fire*, *Knights of the Cross*, etc. His first novel, one of humor, was entitled *A Prophet in His Own Country*. He died in 1916.

Sien′na, or SIENNA EARTH (It. *Tierra di Sienna*, 'earth of Sienna'), a ferruginous ochreous earth, which when raw is of a fine yellow color, and when burned assumes a rich orange-red tint. It is used as a pigment in both oil and water-color painting.

Sieradz (syā′rȧds), a town of Russian Poland, government of Kalish, on the Warta, 127 miles s. w. of Warsaw. It is an ancient place, having been founded prior to the introduction of Christianity. Pop. 7019.

Sierra (sē-er′rȧ; Spanish, 'a saw'), a term applied in Spain and Spanish-peopled countries to a ridge of mountains.

Sierra Leone (si-er′ra le-ō′nē), a British colony on the coast of Western Africa; a coaling station for the Royal Navy, and the headquarters of the West India regiments stationed on the west coast of Africa. The colony consists of the peninsula of Sierra Leone proper, Sherbro Island and several other small islands, and the whole coast region from the French territory on the northwest to that of Liberia on the

southeast; area in occupation, 468 square miles; of entire colony, about 4000 square miles. The inhabitants depend chiefly upon trade, and are mostly collected in Freetown (the capital) and the neighboring villages. The exports are palm kernels, palm-oil, rubber, ground-nuts, kola-nuts, gum-copal, hides, ginger, and benné-seed. The trade is chiefly with Great Britain. Education is purely denominational, but is assisted by state aid. Fourah Bay College, for the education of a native ministry supported by the Church Missionary Society, is affiliated with Durham University. Sierra Leone is a crown colony under the governor of the West Africa Settlements; but four people's representatives are called to the Legislative Council. It first became a British colony in 1787, when a company was formed with the intention of making it a home for rescued slaves. One great obstacle to the prosperity of the colony is the deadly nature of its climate, particularly to Europeans, and Sierra Leone was long known as the 'white man's grave.' But Freetown, in particular, has now a good supply of pure water, and great improvements in sanitation have recently been effected. Pop. 76,655.

Sierra Madre (mȧ′drā), the name given the mountain range that bounds the Mexican plateau on the west. The eastern and central mountains are also often given the same name.

Sierra Morena (mō-rē′na), a chain of mountains in Spain, between New Castile and Andalusia, separating the Guadiana on the north and the Guadalquivir on the south, and attaining a height of 5550 feet above sea-level.

Sierra Nevada (nē-vä′dȧ; Spanish, 'Snowy Range'), a chain of mountains in Southern Spain, the most elevated in the peninsula. The greater part of it is in the province of Granada, running east and west, and the highest peak is Mulahacen, which has an elevation of about 11,678 feet, and is capped with everlasting snow. The range is rich in fertile valleys and picturesque scenery.

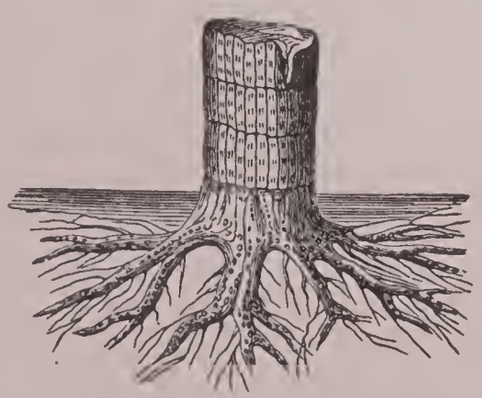
Sierra Nevada, a mountain range in California, extending north and south along the eastern boundary of the state, over an extent of 400 miles. It consists of an aggregate of ranges, on an average some 70 miles wide, with numerous peaks reaching an elevation of from 10,000 to over 14,000 feet, Mount Whitney (the loftiest peak of the United States outside of Alaska) being 14,898 feet high. Gold-mining, timber-cutting, and sheep-rearing are important industries in these ranges. Deep and narrow valleys are striking features of the range, these having almost vertical walls thousands of feet in height. They include the famous Yosemite, the Hetch-hetchy, and others. Much of the region is densely forested, its trees including the gigantic *Sequoia gigantea*, the greatest of trees.

Sieyès (sye-yās), Emmanuel Joseph, better known as the Abbé Sieyès, was born at Fréjus in 1748, and pursued his studies for the church at Paris. He was active in furthering the progress of the revolution, and soon acquired great influence in the National Assembly. He originated the idea of the new geographical division of France into departments, arrondissements, and communes. In 1791 he became member for the Seine department, and in 1792 deputy for the department of Sarthe. During the Reign of Terror he withdrew into the country, but after Robespierre's downfall he returned to the convention and took an active part in affairs. In 1799, on his return from a mission to Berlin, by which he secured the neutrality of Prussia, he became a member of the directory. He subsequently suppressed the Jacobin Club, and was active in bringing about the overthrow of the directory and the substitution of the consular government by the revolution of the 18th Brumaire, the new constitution being devised by him. But Sieyès soon found his speculations completely overmatched by Bonaparte's practical energy, and though a consul provisionally, he saw it desirable to terminate his political career. He retired with the title of count, and obtained grants of land and property to the value of at least $250,000. He was exiled at the restoration, but returned on the July revolution of 1830, and died at Paris in 1836.

Sight (sīt), Defects of, are usually caused by anomalies in the shape of the eye. (See *Eye.*) The normal eye is an optical apparatus so constructed that the images of distant objects are thrown with sharpness on the retina; if this is not the case the objects are not seen distinctly. There are two very common instances of defective eyesight, short-sight, or *myopia*, and long-sight, or *hypermetropia*, the one being the reverse of the other. In the former case, owing to the too great power of the crystalline lens, or to the eye cavity extending too far backwards, images from objects at some distance are formed in front of the retina. The sight of the myope is thus confused or absolutely defective for objects beyond a certain short range, but

on the other hand it is very clear for near objects. The remedy for myopia is the employment of biconcave glasses, which, if the myopia is not considerable, need only be used for looking at distant objects. In the case of *hypermetropia* objects are seen distinctly only at a range beyond that belonging to normal vision. Owing to the shortness of the eye cavity the lenses in this case are unable to converge the rays to a focus within the limits of the eye-chamber, the image being therefore formed (theoretically) behind the eye. This defect is corrected by the use of convex lenses, which, by converging the rays of light, cause the image to fall on the retina. Both these defects are usually congenital. A similar defect to hypermetropia is that of *presbyopia* (Greek *presbys*, old), which usually comes on with advancing years, and is due to diminished focusing power and lessened elasticity of the lens, the result being that the image of a near object is not clearly formed on the retina but behind it, while distant objects are seen as well as ever. The remedy in this case also is convex lenses. *Astigmatism* is a defect usually characterized by asymmetry in the curvature of the cornea in different meridians. (See *Astigmatism.*) Opacities in the cornea or crystalline lens, etc., are also not uncommon causes of defective eyesight.— *Double-vision* is when, as in some cases of squinting, each eye sees things separately or it may result from muscular paralysis.— *Night-blindness* or *hemeralopia* is a peculiar defect by which a person becomes suddenly and entirely blind when night comes on, though he can see perfectly well in the daytime. See *Night-blindness.* See also *Color-blindness* and *Squinting.*

Sigillaria (sij-i-lā′ri-a), a genus of fossil plants found in great abundance in the coal measures. The plant occurs in the form of compressed



Sigillaria in a Coal-mine near Liverpool.

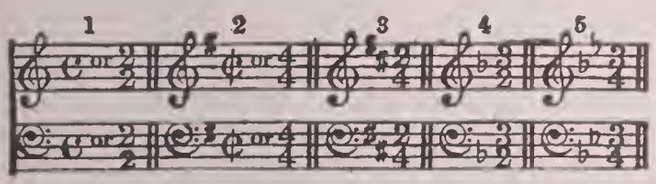
stems attaining a height of 40 to 50 feet, and a breadth of 5 feet. The stem generally occurs as a double layer of coal with a fluted outer surface, and showing, at regular intervals, the scars produced by the bases of the leaf-stalk. Their roots are found in the shale, and are known by the name of *stigmaria*, being at first supposed to be distinct plants. No foliage of any kind has been found connected with the trunk. Some suppose sigillarias to be allied to tree-ferns, others to Coniferæ.

Sigismund (sij′is-mund), a German emperor from 1411-37, was born in 1368, and on the death of his father, the emperor Charles IV, he obtained the margraviate of Brandenburg. He married Mary, daughter and heiress of Louis the Great of Poland and Hungary; but on the latter's death in 1383 the Poles elected Mary's sister as queen; Sigismund, however, was crowned king of Hungary in 1387. He was subsequently involved in a war with Turkey, and being defeated by Bajazet at Nicopolis in 1396, he fled into Greece. On his return to Hungary in 1401 he was made prisoner, and the nation gave the throne to Ladislaus of Naples. Sigismund escaped, and having raised a powerful force, reduced Hungary to subjection. In 1411 he was elected emperor of Germany, and crowned at Aix-la-Chapelle. He took a leading part in the Council of Constance in 1414, but disgraced himself by allowing John Huss, to whom he had granted letters of safe-conduct, to be put to death. On the death of Wenceslaus in 1419 the Hussites refused to acknowledge his succession to the kingdom of Bohemia until he had signed the compact with the Council of Basel in 1431. He was then crowned emperor at Milan, and again at Rome in 1433. He was now in possession of the imperial crown and the crown of four kingdoms. He died at Znaim in 1437.

Signals (sig′nalz), the means of communicating to the eye — as by flags, lights, etc., and to the ear — as by guns, steam-whistles, fog-horns, rockets, etc., intelligence to greater distances than can be reached by the human voice. The most complete system of signaling is that devised to enable ships to communicate when at some distance. The system now in general use is a combination of square and triangular flags of the same length, and of pendants which are a little longer; the colors are black, white, red, blue, and yellow, but the first two are most used, as being more easily distinguished. For signaling in windy weather solid figures of canvas on iron frames have been introduced; but the cone, cube, cylinder, and sphere,

which present the same appearance seen from all points, are the only figures available. Consequently the number of signs is limited, and this renders a code desirable. A word may be easily spelled by hanging many flags one above another, but with flags to represent a few symbols — *e. g.*, the nine numerals, 0, and two repeaters — much time is saved if a combination of four symbols be taken arbitrarily to represent a word or common phrase; this is a code. The above-named symbols can communicate 14,000 words and phrases; and they form the basis of the code adopted by the United States navy and the British Admiralty and Board of Trade. In the army signaling is carried on during the day by means of flags, sun-flashes (see *Heliograph*), etc.; and during the night by means of colored lamps, or by a system of long and short flashes of light. On the railways signaling is effected by the semaphore, colored lights, and during fog by cases filled with detonating powder and placed on the rails at certain places, to be exploded by the wheels of the passing locomotive. See *Fog-signals* and *Heliostat.*

Signature (sig'na-tūr), in music, the signs placed at the commencement of a piece of music. They are of two kinds, the time signature and the key signature. The key signature, including the clefs, is usually written on every stave; and the sharps



Key and Time Signatures on the Treble and Bass Clefs.

1, Key of C; two minims (or their equivalents) in the bar. 2, Key of G; four crotchets in the bar. 3, Key of D; two crotchets in the bar. 4, Key of F; three minims in the bar. 5, Key of B flat; three crotchets in the bar.

or flats there occurring affect all notes of that degree (with their octaves) throughout the piece. The time signature is placed only at the beginning of the first line and where changes occur. It indicates the number of aliquot parts into which the bar is divided.

Signature, among printers, a number or letter placed on the first page of each sheet of a book, to distinguish the sheets and serve as a guide to the binder.

Signet (sig'net), in England, one of the royal seals, used for the authentication of royal grants. In Scotland the signet is a seal by which royal warrants for the purpose of justice seem to have been at one time authenticated. The *clerks to the signet* or *writers to the signet* are a class of legal practitioners in Scotland who formerly had important privileges, which are now nearly abolished. They act generally as agents or attorneys in conducting causes before the Court of Session.

Sign-manual, ROYAL, the signature of the sovereign, which must be adhibited to all writs which have to pass the privy seal or great seal. The sign-manual consists usually of the initial letter of the sovereign's name, with the letter R (for *rex* or *regina*) added.

Signorelli (sēn-yo-rel'lē), LUCA (called also, from his birthplace, LUCA DA CORTONA), a celebrated Italian painter, was born at Cortona about 1441, and studied under Piero della Francesca at Arezzo. He began to distinguish himself about 1472, and painted till 1512, or perhaps later. He was the first to apply anatomical knowledge to painting, and thus became the precursor of Michael Angelo. His greatest works are a series of magnificent frescoes in the cathedral of Orvieto, comprising the *History of Antichrist*, and *Resurrection of the Dead, Hell and Paradise.* These frescoes were finished between 1499 and 1502. Of his other works the most remarkable are the *Madonna Enthroned*, in the cathedral of Perugia; the *Adoration of the Magi*, now in the Louvre; the *Annunciation*, and a *Madonna*, at Volterra. Signorelli was a man of high character. He died at Arezzo about 1525.

Signs (sīns), ASTRONOMICAL. See *Symbols (Astronomical).*

Signs, MATHEMATICAL, symbols which indicate mathematical processes and conditions. $a + b$, $a - b$, $a \div b$, $a \times b$, and $a \sim b$ read a plus b, a minus b, a divided by b, a multiplied by b, and the difference between a and b; $a > b$, $a < b$, $a = b$, $a \equiv b$, and $a - b$ read a greater than b, a less than b, a equal to b, a approximately equal to b, and a identical with b; f is the sign of integration; $\therefore$ denotes *then* or *therefore*, and $\because$ denotes *since* or *because*; $\sqrt{a}$, $\sqrt[3]{a}$, $\sqrt[n]{a}$ represent the square root, the cube root, and the nth root of a.

Sigourney (sig'ur-nē), LYDIA HUNTLEY, an American authoress, was born at Norwich, Connecticut, in 1791; died in 1865. In 1815 she published a volume entitled *Moral Pieces in Prose and Verse*, which was

quickly followed by other works, most of which enjoyed a great popularity. Among her principal poems are: *Traits of the Aborigines of America, Zinzendorf, The Western Home*, and *Pocahontas*. Her prose works are mainly biographical, historical, didactic, and epistolary.

Sigsbee (sigs'bē), CHARLES DWIGHT, naval officer, born at Albany, New York, in 1845; was graduated from the Naval Academy in 1863; served in the battle of Mobile Bay in the Civil war; and commanded the *Maine* in 1898, when it was blown up in Havana harbor. During the Spanish war he commanded the scout steamer St. Paul. In 1900 he was made chief of the bureau of naval intelligence. Retired in 1907. He invented a new method in deep-sea sounding and made other inventions.

Siguenza (sē-gen'thȧ), a town in Spain, in the province of Guadalajara, 72 miles northwest of Madrid. It is a place of considerable antiquity, and contains a fine Gothic cathedral. Pop. 4638.

Sigurd (zē'görd), or SIGURDR, in northern mythology, the hero of the *Volsunga Saga*, on which the *Nibelungenlied* is based. According to the legend of the Volsungs, Sigurd (the Siegfried of the *Nibelungenlied*) is the posthumous son of Sigmund, son of Volsung, a descendant of Odin. After obtaining the golden treasure by slaying the dragon Fafnir with his good sword Gram he eats the monster's heart, and thus acquires the power of understanding the songs of birds. He then rides through a volume of flame surrounding a house in which the fair Brenhyldr (Brunhild) lay asleep. He wakes Brenhyldr, to whom he plights his troth, and then rides to the palace of Giuki the Niflung, whose wife gives him a potion which causes him to forget Brenhyldr and he marries Gudrun (Chriemhild), Giuki's daughter. Her brother Gunnar (Gunther) determines to marry Brenhyldr, but is unable to ride through the flames; so his mother by her arts causes Sigurd to go through the flames and bring away Brenhyldr in the form of Gunnar. Sigurd then resumes his shape, and Brenhyldr is handed over to Gunnar. When Brenhyldr hears the true story of her rescue her love for the hero turns to hatred, and she seeks to slay him. Sigurd is eventually killed by Gunnar's half-brother. His death revives Brenhyldr's love, and she dies of a broken heart. This story has given rise to more discussion than any other subject connected with the Teutonic Heroic age.

Sihon. See *Sir-Daria*.

Sikandarabad. See *Secunderabad*.

Sikhs (sēks; from a Sanskrit word meaning 'disciple'), a religious sect in Northwestern Hindustan which worships one only and invisible God. Its founder was Nanak Shah, born in 1469 in the province of Lahore. He labored to lead the people to a practical religion, to a pure worship of God and love to mankind. He died about 1540. Of his successors Arjun-mal gave stability and unity to the religion by publishing Nanak's writings in the *Adi-Granth*, the first sacred book of the Sikhs. The Sikhs had now rejected the authority of the Koran and the Vedas and thus aroused the enmity both of the Mohammedans and Brahmans. Arjun-

Sikh Soldiers.

mal was thrown into prison, where he died. His son and successor, Har Govind, transformed the Sikhs from peaceful believers into valiant warriors, and under his reign began the bloody contest with the Mohammedans. The real founder of the Sikh state was Govind Sinh, or Singh, the tenth ruler from Nanak. He abolished the system of castes, and gave all men equal rights. His followers, owing to their valor in the protracted contest with the Mohammedans, received the title of Sinhs or lions. Govind Sinh wrote the *Dasema Padshah ke Granth*, or book of the tenth prince, which, besides treating of religious sub-

jects, contained the history of the author's exploits. The Sikhs hold it in equal veneration with the *Adi-Granth*. Govind Sinh died in 1708, and the Sikhs gradually yielded to the superior power of the Mohammedans. A small number of the Sikhs escaped to inaccessible mountains, and preserved the doctrines of their fathers and an inextinguishable hatred towards the Mohammedans. After Nadir Shah's return to Persia they left the mountains and subdued all Lahore. The Sikhs then broke up into a number of independent communities, each governed by a *sirdar;* but in 1792 Runjeet Singh established himself as despotic ruler of the Sikhs with the title of Maharajah. The territory of the Sikhs now comprehended the whole Punjab, part of Multan, and most of the country between the Jumna and Sutlej; total area, 69,000 square miles. After Runjeet Singh's death, in 1839, a period of anarchy followed. In 1845 (first Sikh war) the Sikhs attacked the British under Sir Hugh Gough at Mudki. Here they were repulsed (December 18), and again defeated at Ferozeshah three days later. On January 20, 1846, the Sikhs were routed by Sir H. Smith near Aliwal, and on February 10 by Gough at Sobraon. A treaty was signed by which Britain held the city of Lahore, and a British resident took supervision of the government. In 1848 a general revolt broke out, and it was evident that the Sikhs had resolved on a decisive struggle, being also assisted by the Afghans. In this, the second Sikh war, Lord Gough advanced with an army against them, but received a severe check at Chillianwalla, January 13, 1849. Both armies were then reinforced, and on February 21, at Gujerat, the power of the Sikhs was completely broken. The Sikh dominion was proclaimed at an end on March 29, and the Punjab was annexed to the British Empire in India, the Maharajah Dhulip Singh receiving an annuity of £50,000. (See *Punjab.*) The bulk of the Sikhs are of Jât origin; they are of fine physique, and possess great powers of endurance as well as courage. During the mutiny the Sikhs displayed the utmost loyalty to the British. They number over 2,000,000, and compose the mass of the gentry in the region between the Five Rivers.

Si-kiang (sē-kē-ang′), or WEST RIVER, China, by far the most important of the streams which unite to form the Canton River. It is navigable for vessels drawing 12 feet 75 miles from the sea. See *Canton.*

Sikino (sik′i-nō; ancient *Sikinos*), a small island of the Cyclades, in the Grecian Archipelago, east of Melos; area, 17 square miles. Pop. 700. The surface is lofty, but the soil is fertile. The staple product is wine.

Sikkim (sik′im), a rajahship under British protection in North Hindustan, bounded on the north and northeast by Tibet, southeast by Bhutan, south by Darjiling, and west by Nepal; area, about 1550 square miles. Sikkim is situated at a considerable elevation within the Himalayan mountain zone, and the passes into Tibet range from 13,000 to 16,000 feet above sea-level. The largest river is the Teesta, which, like the rest of the drainage, belongs to the basin of the Ganges. Little is known of the mineral resources of the country. The valleys and slopes are covered with dense jungle, and the vegetation varies, according to the elevation, from the cotton, banyan, and fig in the lower zones, to the fir, rhododendron, and dwarf bamboo in the upper. The climate is unhealthy in the valleys, but salubrious above 4000 feet. The cultivated soil raises good crops of millet, maize, rice, tea and cotton. The aboriginal inhabitants are Lepchas, with marked Mongolian features and a language radically Tibetan. The capital is Tumlong. Pop. 59,014.

Silage (sī′lij), a term applied to fodder which has been preserved by the process of ensilage (which see).

Silene (sī-lē′nē), a genus of plants belonging to the nat. order Caryophyllaceæ. The species are in general herbaceous, many annual, very few shrubby. The stems and calyces of many of the species are viscous, hence the popular name *catch-fly*. They are mostly natives of South Europe and North Africa. Moss campion or stemless catchfly (*S. acaulis*) is found on nearly all the Scotch mountains, and on the Devonshire and Cumberland hills. Its flowers are of a beautiful purple color. Bladder campion (*S. inflata*) abounds in Britain. It is about one foot high, and has white flowers, with an inflated calyx. The young shoots may be used like asparagus. *S. acaulis* and *S. inflata* and two other species are found in the United States.

Silenus (sī-lē′nus), a Grecian divinity, foster-father and constant companion of Bacchus, and likewise leader of the satyrs. He was represented as a robust old man, generally in a state of intoxication, and riding on an ass carrying a cantharus or bottle.

Silesia (si-lē′shi-a; in German, *Schlesien*), a territory of Central

Europe, now partitioned among Germany, Poland and Czechoslovakia. Prussian Silesia (15,000 sq. miles; pop. 5,000,000) is bounded east and north by Poland, south by Czechoslovakia, and west and north by Saxony and Brandenburg. The province is intersected by branches of the Sudetic Mountains in the south, but is level towards Brandenburg and Posen, and although in parts marshy and sandy, is yet fertile. The principal river is the Oder. Silesia produces corn, flax, madder, hemp, hops, tobacco, fruits, and tolerable wines. The mountainous parts yield timber and afford good pasturage and meadow land. Minerals include iron, copper, lead, zinc, silver, coal, sulphur, etc., and there are mineral waters in several places. The coal output is very large and great quantities of iron and zinc ore are mined; lead is also an important product. Linen, cotton, and woolen goods, and leather are the chief manufactures. Silesia is divided into three governments — Breslau, Liegnitz, and Oppeln. Breslau is the capital. Silesia was annexed to Poland in the beginning of the tenth century. In 1163 it became independent, and was governed by three dukes of the royal house of Piast. At the beginning of the fourteenth century seventeen independent dukes reigned in Silesia at one time, and ruined the country by their feuds. In order to escape the grasp of Poland it acknowledged the sovereignty of the Bohemian kings. In 1675 the ducal line of Piast became extinct, and the country was incorporated in the Austrian dominions. In 1763, at the close of the Seven Years' war, a great part of Silesia was ceded to Prussia. In 1921 a portion of the territory in the southeast, and a strip on the east was given to Poland by pronouncement of the League of Nations, following a plebiscite. Polish Silesia includes some of the rich producing mines. Silesia in Czechoslovakia (formerly Austrian Silesia), in the northwest of that state, has an area of 1596 sq. miles; pop. 600,000. It is mountainous, and although the soil is not in all parts favorable, it is rendered productive by the inhabitants, who are also engaged in various manufactures.

Silex (sī'liks), same as *Silica* (which see).

Silhet, or SYLHET (sil-het'), chief town in the district of the same name, Assam, Hindustan, on the right bank of the Surmá. The houses of the Europeans are built on hillocks surrounded by fine spreading oaks, but the native quarter is overgrown with vegetation and intersected by open sewers. Pop. 14,407.— The district, area 5413 square miles, consists of a uniform level intersected by a network of rivers and drainage channels. Rice is its chief crop.

Silhouette (sil-u-et'), is the representation of the outlines of an object filled in with black color, in which the inner parts are sometimes indicated by lines of a lighter color, and shadows or extreme depths by the aid of a heightening of gum or other shining medium. The name comes from Étienne de Silhouette, French minister of finance in 1759, in derision of his economical attempts to reform the financial state of France while minister. During this period all the fashions in Paris took the character of parsimony, and were called *à la Silhouette.* The name has only remained in the case of these drawings.

Silica (sil'i-ka; SiO_2), a compound of oxygen and silicon, forming one of the most frequently occurring substances in the materials of which this globe is composed. Silica forms a principal ingredient in nearly all the earthly minerals, and occurs either in a crystallized form or in the amorphous masses. In its naturally crystallized form it is known as *rock-crystal.* Colored of a delicate purple these crystals are known as *amethyst,* and when of a brown color, as *Cairngorm-stone.* Silica is also met with in the form of *chalcedony* and *carnelian.* It enters largely into the lapidary's art, and we find it constituting jasper, agate, cat's-eye, onyx, and opal. In opal the silica is combined with water. The resistance offered by silica to all impressions is exemplified in the case of *flint,* which consists essentially of silica colored with some impurity. Silica is found to constitute the great bulk of the soil which serves as a support and food of land plants, and it enters largely into the composition of many rocks. Many natural waters present us with silica in a dissolved state. It is, however, not soluble in pure water. The action of an alkali is required to bring it into a soluble form. Silica forms a number of hydrates, which have acid properties, and from which a vast number of salts known as silicates are obtained.

Silicate Paint (sil'i-kāt), natural silica, when dried and forming an almost impalpable powder, mixed with colors and oil. Unlike the ordinary lead paints, all the silicate colors are non-poisonous. Silicate white has great covering power; it is not affected by gases; and heat of 500° is successfully resisted.

Courtesy of Belding Bros. & Co.

REMOVING SILK FROM COCOONS

Japanese women reeling the strands from several cocoons into one thread. The trays at the left of the picture contain cocoons

Silicon (sil'i-kon), the non-metallic element of which silica is the oxide; chemical symbol, Si; atomic weight, 28. It may be obtained in amorphous and crystalline states. In the latter form (adamantine silicon) it is very hard, dark-brown, lustrous, and not readily oxidized. It unites with hydrogen, chlorine, etc., to form well-marked compounds.

Siliqua (sil'i-kwa), in botany, a kind of seed-vessel, such as the long pod-like fruit of crucifers. It is characterized by dehiscing by two valves which separate from a central portion called the *replum*. It is linear in form, and is always superior to the calyx and corolla. The seeds are attached to two placentæ, which adhere to the replum, and are opposite to the lobes of the stigma. Examples may be seen in the stock or wall-flower, and in the cabbage, turnip, and mustard.

Siliquaria (sil-i-kwā'-ri-a), a genus of marine gasteropodous molluscs, found both fossil and recent. The shell is tubular, spiral at its beginning, continued in an irregular form; divided laterally through its whole length by a narrow slit, and formed into chambers by entire septa.

Siliquaria anguina.

Silistria (si-lis'trē-a), a town of Bulgaria, on the right bank of the Danube, 66 miles north by east of Shumla. It was an ill-built and dirty town until the war with Russia in 1853-56, but after that time it was considerably improved. Silistria was strongly fortified up to 1878, when the fortifications were to be dismantled in accordance with the terms of the Berlin Treaty. In May and June, 1854, with a garrison of 15,000, it successfully resisted a siege of thirty-nine days by 60,000 to 80,000 Russians. Pop. 12,055.

Silius (sil'i-us), CAIUS, surnamed *Italicus*, a celebrated orator and advocate at Rome, born in the reign of Tiberius, about the year 25 A.D. He was consul at the time of Nero's death, and proconsul of Asia under Vespasian. Being seized with an incurable ulcer, he starved himself to death in his seventy-fifth year. The only work of Silius which has reached modern times is an epic poem on the second Punic war.

Silk, the peculiar glossy thread spun by the caterpillars or larvæ of certain species of moths, and a well-known kind of fabric manufactured from it. The chief silk-producing larvæ belong to the family of the Bombycidæ, of which group the common silk-moth (*Bombyx mori*) is the most familiar species, being that which is by far the most important in the production of silk. This family of moths is distinguished by the small size of the proboscis, by the thick hairy body; and by the large, broad wings. The common silk-moth possesses a short body, stout legs and white wings, which are marked by black lines running parallel with the wing borders. The female moth deposits her eggs in summer on the leaves of the mulberry-tree. (*Morus alba.*) For hatching artificially the eggs are placed in a room heated gradually up to a temperature of about 80° Fahr. In eight or ten days the young appear. The caterpillars are then covered with sheets of paper on which mulberry leaves are spread, and make their way through perforations in the paper to the mulberry leaves, their natural food. The leaves when covered with caterpillars are laid on shelves of wicker-work covered with brown paper. When first hatched the larvæ or worms are black and about ¼ inch long. The larval or caterpillar stage lasts from six to eight weeks, and during this period the insect generally casts its skin four times. After casting its last skin the insect is about 2 inches long, and in ten days attains its full growth of 3 inches. The insect's body consists of twelve apparent segments, with six anterior forelegs, and ten fleshy legs or 'prolegs' provided with hooks in the hinder body-segments. The mouth is large, with powerful jaws. At this stage the insect becomes languid, refuses food, and prepares for its next change into the pupa or chrysalis stage. Oak, broom, or other twigs are now laid on the wicker frames, and the worms crawl into these, where they spin their cocoon by

Silk-worm — Larva, Chrysalis and Cocoon.

winding a self-produced silk thread many times round their body. This silky thread is formed from a glutinous secretion contained in two tubular glands on either side of the body, opening on the lower lip of the larva in a prominent aperture called the *spinneret*. This secretion becomes tenacious and thread-like when brought in contact with the air, and the two filaments unite as they issue from the spinneret, apparently by the glutinous secretion of another and special gland. The spinning of the pupa-case or cocoon lasts from three to five days. After passing about three weeks in the nymph or chrysalis stage, the larval form emerges from the cocoon as the perfect moth or *imago*. But those insects destined to afford the silk material are not allowed to enter the *imago* stage. The completed cocoon with its contained larva is thrown into warm water, which dissolves the glutinous matter cementing the threads together, and facilitates the unwinding of the silk. The average length of the thread furnished by a single cocoon is 300 yards. About 12 lbs. of cocoons yield 1 lb. of raw silk, and 1 oz. of silk-worms' eggs will give 100 lbs. of cocoons. The female moth produces from 300 to 500 eggs.

For the perfect and successful cultivation of the silk-worm, vigorous and healthy mulberry-trees are necessary. The favorite European species is *Morus alba* or white mulberry. Other noted species are *M. alpina*, *M. Moretti*, and *M. japonica*, the latter introduced from Japan. Among the most destructive diseases of the silk-moth's eggs and larvæ are those known by the names of *muscardine* and *pébrine*. The latter disease created great ravages in France for some years, and ruined many cultivators, but latterly has been successfully combated.

In Europe some moths produce one generation, others two generations annually; but the caterpillars from the former class produce the best silk. In India some forms produce eggs monthly, while three or four generations annually are not uncommon in that country. A valued variety of the *Bombyx mori* is the Novi race of Italy, which spins a large white oval cocoon. The Japanese race produces a cocoon having a divided appearance in the center. The *Bombyx Yama-mai*, or Japanese oak-feeding silk-moth, produces a green cocoon, the silk of which is much used for embroidery. *B. Peryini* inhabits North China and is also an oak-feeder. Its cocoon is large and grayish-brown in color. The *B. Cynthia* of China and North Asia manufactures a gray cocoon, from which the Chinese manufacture a silk recognized by its soft texture. From the cocoon of the *Antheræa Paphia* of India, or '*tussur* moth,' the natives manufacture the Tussur silk fabric. *Bombyx textor* of Bengal makes a pure white silk used by the natives. There are several other varieties of silk-producing moths, but they are less notable and commercially unimportant.

The Chinese appear to have been the first to render the filamentous cocoon substance serviceable to man, and China is still the chief silk-producing country in the world. Before the reign of Augustus the use of silk was little known in Europe, and the culture of the silk-worm was not introduced until the sixth century. It was at first confined to Constantinople, but soon spread to Greece, and then through Italy to Spain. When the Duke of Parma took Antwerp in 1585 a check was put on its trade in silk goods, and many of the weavers from Flanders and Brebant took refuge in England. In France looms were set up at Lyons in 1450, and at Tours in 1470. The first nursery of white mulberry-trees was founded by a working gardener of Nismes, who ultimately propagated them in many districts in the south of France. In 1685 the Edict of Nantes drove hosts of silk workers into exile, as many as 50,000 having settled in Spitalfields, London. A silk-throwing machine, constructed on Italian models secretly obtained, was fitted up at Derby in 1714 by Thomas Lombe (afterwards Sir Thomas Lombe), who obtained a patent in 1719, and on its expiration received a grant of £14,000 for his services to his country. Italy is now the chief silk-producing country in Europe, France coming next. Of the world's crop about two-thirds is produced in the East.

In the manufacture of silk the first operation is the unwinding of the cocoons and the *reeling* of the silk. For this purpose they are placed in shallow vessels containing hot water, which softens the gummy matter of the cocoons. The ends of the filaments are then conducted by guides to large reels moved by machinery. Four or five (or more) threads from as many different cocoons are thus brought together, and uniting by the gum form one thread. When the cocoon is half unwound the filament decreases 50 per cent. in thickness. The silk thus produced is called *raw silk*. Before it can be woven into cloth the raw silk must be *thrown*. This is often a special trade, and is

conducted by machinery in large mills. Previous to *throwing*, the silk is carefully washed, bound on bobbins, and assorted as to its quality. In the throwing-machine it is again unwound from the bobbins and twisted.

The operations of *throwing* are dependent upon what kind of yarn is desired. (1) *Silk used for the warp in woven goods.* After winding, the individual thread is twisted about sixteen turns per inch to the left; two or three of these (depending upon the size desired) are combined and twisted usually fourteen turns per inch to the right or opposite direction and then reeled into skeins. This is called *Organzine.* (2) *Silk used for knitting and in the weft of woven goods.* After winding, two or more threads (depending upon size desired) are combined together without any twist being given the individual thread. The combined threads are then twisted together and afterwards reeled. The twist per inch depends entirely upon its use; but for weaving and knitting the standard is three turns per inch. This is known as *Tram.* (3) *Crepe fabrics.* When the weft yarn is used for making crepe fabrics (these are woven in the raw and dyed in the piece) the twist per inch runs up as high as 85 turns per inch. This is known as *Crepe Tram.* (4) *Embroidery and twists.* This silk is used for tassels and other decorative purposes, and is made by combining two or more of the raw ends of silk, then twisting them together in the right direction. After this is done, two or three of these ends are combined again and given twist in the opposite direction and the silk is reeled into skeins ready for use.

The manufacture of *waste* silk is quite different from that just described, being more akin to that of wool or cotton. Waste silk consists of the floss-silk or outer fibers of the cocoons; of the silk of defective cocoons, such as those from which the moths have been allowed to issue; of the remains of cocoons from which the fiber has been mostly reeled.

While the culture of silk-worms has been attempted at various times in the United States, beginning in Georgia shortly after its settlement, it has never proved a success. On the other hand the manufacture of silk has made tremendous progress in this country, and the American market has become of the utmost importance, consuming about half of the world's raw silk product. The chief countries supplying raw silk are Japan, China, Italy, the Levant, India, etc. The silk manufacture in the United States is mainly concentrated in New Jersey and Pennsylvania. Paterson, N. J., is the leading city in the production of silk fabrics and sewing silk. The value of the silk goods produced in the United States in 1921 was estimated at more than $300,000,000. The total raw silk product of the world is nearly 100,000,000 pounds.

Silk, Artificial, a silk-like fiber made from cellulose, obtained either from wood-pulp or from specially prepared cotton. *Chardonnet silk* (invented by Comte de Chardonnet, 1889), is prepared by treating cotton with nitric acid and dissolving the resulting nitro-cellulose in a mixture of alcohol and ether. *Viscose silk* is prepared from wood-pulp which is treated with caustic soda and carbon disulfide. The product, alkali-cellulose-xanthate, is pressed into threads which are made glossy (mercerized) by stretching and treating with caustic soda. Another type of artificial silk is made by dissolving cellulose in an ammoniacal solution of copper oxide. Besides being used in fabrics, artificial silk makes durable mantles for incandescent lights.

Silk Cotton, a silky fiber produced by the silk-cotton trees composing the genus *Bombax* and other genera included in the natural order Molvaceæ. The fiber, which is contained in the seed capsules, cannot be spun into yarn, but it is used for stuffing pillows, sofas, etc.

Silk-worm. See *Silk.*

Silkworm-gut, a substance prepared from the silky secretion of the caterpillars of the ordinary silk-worm taken from the insects' body, and constituting the lustrous and strong line so well known to anglers.

Sill, Edward Rowland (1841-87), an American educator and author, born at Windsor, Conn., graduated from Yale, 1861. He was professor of English literature at University of California 1874-82. He wrote *The Venus of Milo*, *The Hermitage*, and many other poems.

Silliman (sil'li-man), Benjamin, physicist, was born in North Stratford (now Trumbull), Connecticut, Aug. 8, 1779; died Nov. 26, 1864. He was admitted to the bar in 1802, but in the same year abandoned law to take up a professorship of chemistry at Yale College. After studying under Dr. Woodhouse, at Philadelphia, he delivered his first course of lectures at Yale in the winter of 1804-05. He then spent fourteen months in England, Scotland, and Holland to prosecute further his studies in physical science. Shortly after his

return he made a geological survey of a part of Connecticut. In 1818 he founded the *American Journal of Science and Arts*, of which he was sole editor for twenty years. He made a second visit to Europe in 1851, and in 1855 gave his last course of lectures at Yale.— His son, BENJAMIN (1816–85), was assistant and successor to his father both as professor and editor. He wrote works on chemistry and physics, including *First Principles of Chemistry* (1846) and *Principles of Physics* (1858), also many papers on scientific subjects and was one of the original members of the National Academy of Sciences.

Silos. See *Ensilage.*

Silphidæ (sil'fi-dē), a family of beetles which subsist upon putrefying substances. See *Burying-beetle.*

Silures (sil-ū'rēz), an ancient British tribe which inhabited the district included in the modern counties of Hereford, Radnor, Brecknock, Monmouth, and Glamorgan. They were of the earlier Celtic stock, and were among the most warlike of the British tribes. They were subdued by the Romans about 78 A.D.

Silurian System. See *Geology.*

Siluridæ. See *Silurus.*

Silurus (sil-ū'rus), a genus of fishes of the family Siluridæ, order Physostomi. This genus, of which five species are known, inhabits the temperate parts of Europe and Asia. The head and body are covered with soft skin, and the jaws have four or six barbels. The only species which occurs in Europe is sly silurus or sheat-fish (*Silurus glanis*), found in the fresh waters east of the

Sly Silurus (*Silurus glanis*).

Rhine. It attains to a weight of 300 or 400 lbs., and the flesh is firm and well flavored. The family Siluridæ (otherwise named sheat-fishes) constitutes a very extensive section of fishes, the species of which are, for the most part, confined to the fresh waters of warm climates. They present great diversity of form, but their most obvious external characters are the want of true scales. The mouth is almost always provided with barbules.

Silvas. See *Selvas.*

Silver (sil'ver), one of the earliest known and most useful of the metals. It appears to have been known almost as early as gold, and, without doubt, for the same reason, because it occurs very frequently in a state of purity in the earth, and requires but an ordinary heat for its fusion. Pure silver is of a fine white color. It is softer than copper but harder than gold. When melted its specific gravity is 10.47; when hammered, 10.51. Its chemical symbol is Ag. It is next in malleability to gold, having been beaten into leaves only 100,000th of an inch in thickness. It may be drawn out into a wire much finer than a human hair. It excels all other metals as a conductor of heat and electricity. Silver melts when heated completely red-hot, and may be boiled and volatilized by a very strong and long-continued heat. It is rapidly volatilized when heated on charcoal by the flame of the compound blow-pipe. When cooled slowly crystals of silver may be obtained. Silver is not oxidized by exposure to the air, neither is it affected by water, but it is blackened or tarnished by sulphuretted hydrogen. The atomic weight of silver is 108. *Oxide of silver* (Ag_2O_3) is produced by dissolving silver in a solution of nitric acid and precipitating with an alkali. Its specific gravity is 7.14. The compound called *horn silver* or *chloride of silver* (AgCl) is obtained by dissolving silver in nitric acid and mixing the solution with a solution of common salt. Its specific gravity is 5.550. When exposed to the light it turns to a blackish color, hence its great use in photography. *Bromide of silver* is the most sensitive to light of any known solid. It is used for coating the 'dry-plates' employed in photography. When silver is long exposed to the air it acquires a covering of a violet color, which deprives it of its luster; this coating is sulphide of silver. Sulphide of silver occurs native as *silver-glance.* Silver readily forms alloys with iron, steel, lead, tin, and mercury. Of the combinations of acid and silver the most important is *nitrate of silver* ($AgNO_3$), obtained by dissolving silver in nitric acid. If the silver and acid are pure the solution of silver nitrate is colorless, very heavy, and caustic; it stains the skin, and all animal substances, of an indelible black; after evaporation it deposits, on cooling, transparent crystals of nitrate of silver (which see).

There are five important silver ores,

viz.: native silver, vitreous silver (or silver-glance), black silver, red silver, and horn silver. The first is usually found in dentiform, filiform, and capillary shapes, also in plates formed in fissures and in superficial coatings; luster metallic; color silver-white, more or less subject to tarnish; ductile; hardness between gypsum and calcareous spar; specific gravity, 10.47. Native silver occurs principally in veins, traversing gneiss, clay-slate, and other palæozoic rocks, but not usually in great quantity. It often forms a natural alloy with gold. Vitreous silver presents itself in various shapes, and is of a blackish lead-gray color with a metallic luster. It is malleable, about as hard as gypsum, and subject to tarnish; specific gravity, 7.19. It is more or less pure silver sulphide, and has been found almost exclusively in veins along with ores of lead, antimony, and zinc. It occurs in Saxony, Bohemia, Hungary, Mexico, and Peru; and is an important species for the extraction of silver. Black silver generally occurs in granular masses of an iron-black color. It is sectile and about as hard as gypsum; specific gravity, 6.2. This mineral is a composition of silver (about 68.5 per cent.) with antimony and sulphur and traces of iron, copper, and arsenic. It is found in veins along with other ores of silver, and is a valuable ore for the extraction of silver. It occurs chiefly in Saxony, Bohemia, Hungary, and the American continent. Red silver is found in crystals and often massive, granular, and even as an impalpable powder. It is a double sulphide of silver and antimony, containing on an average 60 per cent. of silver. It occurs in veins with other silver ores, galena, and blende. It is found in various parts of Saxony, also in Bohemia, Hungary, and Norway; but chiefly in Mexico, Peru, and the Western United States. Horn silver, or silver chloride, occurs in crystals and also in crusts and granular masses. It contains about 76 per cent. of silver. It is found in the upper parts of veins in clay-slate, and also in beds with other silver ores or with iron-ochre. It is not abundant in Europe, but occurs in large masses in Mexico and Peru. The above are the ores of silver from which silver is chiefly extracted; but argentiferous sulphides of lead and copper are also smelted for the small proportion of silver they contain.

Silver is extracted from its various ores by *smelting* or *amalgamation*. The former method is founded on the great affinity of silver for lead, which, when fused with silver, acts as a solvent and extracts it from its union with baser metals. The silver is afterwards separated from the lead by the process of cupellation (see *Assaying*), which consists in exposing the melted alloy to a stream of atmospheric air, by which the lead is converted into an oxide (litharge) while the silver remains untouched. The latter method depends upon the property of mercury to dissolve silver without the aid of heat. The first is called the *dry*, the last the *wet* way of treating silver ores. One or the other process is employed according to the nature of the ores. The ores which are treated in the dry way are usually those consisting principally of argentiferous sulphide of lead. By this method the ore is first pulverized and roasted to expel the sulphur, and is then freed from the lead. The ores best adapted to the process of amalgamation are native silver and vitreous silver. The ores are first selected to form a proper mixture with reference to the quantity of silver and sulphur they contain. The sulphur is then got rid of by adding to the mixture of an ore 10 per cent. of common salt, by which, during the furnace operation, the sulphur is oxidized, and the acid thus formed unites with the base of the salt and forms sulphate of soda; while the hydrochloric acid thus set free combines with the silver in the ore that was not in the metallic state, and forms chloride of silver. In this state the ore is reduced to an impalpable powder by various mechanical processes. It is then submitted to the action of mercury, with which it forms what is called an *amalgam*. This amalgam is subjected to the action of heat in a distilling furnace, by which the mercury is sublimed, and the silver remains. Silver is sometimes separated from copper by the process of *eliquation*. This is effected by means of lead, which when brought into fusion with the alloy combines with the silver.

Silver is regarded as money, or the medium of exchange, by at least two-thirds of the population of the globe. In Japan the circulating medium is silver and paper; in China, Corea, Manchuria, Mongolia, Thibet, Siberia, Anam, Cochin China, Tonkin, and Siam, silver alone; also in the East Indies, including Hindostan, Ceylon, Upper and Lower Burmah, and Borneo. The silver is estimated by weight.

The silver mines of North and South America are incomparably more important than those of all the rest of the world. The Mexican mines were worked before the Spanish conquest, and then produced large quantities of silver. They are still the richest in the world, their

annual yield being valued at about $40,000,000. Up to the present time their total yield has been estimated at between $2,800,000,000 and $3,000,000,000. Great deposits of silver have been discovered in the Western States of America, particularly in Nevada, Arizona, California, Colorado, Idaho, Montana, New Mexico, and Utah, and the yield in 1914 amounted to about $40,000,000. Canada stands third, with a product of over $11,000,000. Silver ore, chiefly argentiferous galena, has also been found in great quantities in the Barrier Ranges of New South Wales, and silver is produced in various parts of Europe. The world's annual production of silver is over $100,000,000. From 1792, when the United States mint commenced operations, until 1873, there were coined $8,045,838. In 1873 coinage was stopped by act of congress, but resumed in 1878 under the Bland-Allison act, by which not less than two millions worth nor more than four millions worth of silver bullion was to be coined each month — resulting, up to 1890, in the making of $378,160,793; in addition there were coined from trade dollars $5,078,472; and from seigniorage of bullion purchased under act of 1890 the sum of $6,641,109 — an aggregate of $389,886,374 in full legal tender silver money since 1878. By act of July 14, 1890, the secretary of the treasury was required to purchase 4,500,000 fine ounces of silver bullion each month, and to continue the coinage of silver dollars at the rate of two millions per month until July 1, 1891. Under this act there had been coined $29,408,461 — a total coinage, since 1878, of $419,294,835. Of this amount only $58,016,019 were in circulation June 1, 1893; the remainder being in the treasury or represented by silver certificates. Under the act of July 14, 1890 (known as the Sherman act), there had been purchased silver bullion to the amount of 168,674,590.46 fine ounces, costing $155,930,940.84; paid for by the issue of United States treasury notes payable in coin. The act of July 14, 1890, was repealed in 1893 in special session of Congress called for the purpose, and in 1900 gold was made the standard of coinage in this country, only the smaller silver coins being made. As a result the commercial value of silver greatly declined, becoming for a time less than half its coinage value.

Silver-fir, a species of fir, the *Abies picea* or *Picea pectinata*, so-called from two silvery lines on the under side of the leaves. It yields resin, turpentine, tar, etc. The American silver-fir yields the Canada balsam used for optical and also for various medicinal purposes.

Silver-fish, a variety of the *Cyprīnus aurātus*, or gold-fish.

Silver-fox, a species of fox, *Vulpes argentātus*, inhabiting the northern parts of Asia, Europe and America, and distinguished by its rich and valuable fur.

Silvering, the application of silver leaf is made in the same way as that of gold, for which see *Gilding*.

Silverton (sil'ver-tun), a municipality of New South Wales, the center of the Barrier Ranges silver-mining district. It is situated about 18 miles from the border of South Australia, and 822 miles west of Sydney.

Simbirsk (sem-bērsk'), an eastern government of Russia; area, 19,120 square miles. It consists in general of an extensive fertile plain watered by the Volga and its affluents. Agriculture and cattle-breeding are the leading industries. The principal crops are grain, hemp, flax, hay and tobacco. Minerals are unimportant. There is an abundance of fish in the rivers and numerous small lakes. Pop. 1,783,000.— SIMBIRSK, the capital, stands on a lofty bank of the Volga, 448 miles E. S. E. of Moscow. It has wide streets and squares, a cathedral, etc. There is an annual fair, and a good trade in corn and fish. Pop. about 50,000.

Simcoe Lake (sim'kō), a lake of Ontario, Canada, between Lake Ontario and Georgian Bay, an arm of Lake Huron. It is about 30 miles long and 18 miles wide, and discharges itself into Lake Huron by the river Severn. Its banks are well wooded, and it contains several islands.

Simeon (sim'e-un), TRIBE OF, the descendants of Simeon, the second of Jacob's sons by Leah. They received a section in the southwest of Canaan, which was originally allotted to Judah.

Simeon Stylites (stī-li'tēz). See *Stylites*.

Simferopol (sēm-fer-o'pōl), a town of Russia, capital of the government of Taurida, in the south of the Crimea. The old town is poorly built, and occupied chiefly by Tartars; the new town has spacious streets and squares. Pop. 60,876.

Simia (sim'i-a), the generic name applied by Linnæus to all the monkeys, now the genus which includes the orang.

Simiadæ (sim'i-a-dē), a quadrumanous family of mammals

now limited to include the higher apes, such as the orang, gorilla and chimpanzee.

Simla (sim'la), a town of British India, in the Punjab, chief sanitarium and summer capital of British India, is situated 78 miles N. N. E. of Umballa. It stands 7084 feet above sea-level, on a transverse spur of the Central Himalayas, and consists of scattered bungalows and other buildings, which extend for about 6 miles along the heights, among woods of *deodar*, oak, and rhododendron. Simla contains many fine public buildings, including the viceregal lodge, government buildings, a town-hall, hospital, dispensary, and many schools. A brisk export trade exists in opium, fruits, nuts, and shawl-wool. Its average temperature is about 62°, and its summer heat seldom exceeds 72°. Pop. about 15,000, considerably augmented during the summer season.

Simla Hill States, a collection of twenty-three Indian native states surrounding the sanitarium of Simla; total area, 6569 square miles. The mountains of these states form a continuous series of ranges ascending from the low hills of Ambâla (Umballa) to the great central chain of the Eastern Himalayas. The chief river is the Sutlej. The climate is genial, and the winters comparatively mild.

Simms (simz), WILLIAM GILMORE, novelist, born at Charleston, South Carolina, in 1806; died in June, 1870. He was for some time clerk in a drug house at Charleston, afterwards studied law, and was admitted to the bar in 1827, but abandoned that profession for literature and journalism. He published in 1827 a volume of poems; but his best poem, *Atalantis, a Tale of the Sea*, appeared in 1833. This was followed by a series of romances founded on revolutionary incidents in South Carolina, and by several border tales and historical romances. Among these we may mention *Martin Faber* (1833), *Guy Rivers* (1834), *The Yemassee* (1835), *The Partisan* (1835), *Pelayo* (1838), *The Kinsman* (1841, subsequently called *The Scout*), *The Cacique of Kiawah* (1859). His other works include: *Southern Passages and Pictures*, a series of poems (1839); *History of South Carolina* (1840); *The City of the Silent*, a poem (1851); and *South Carolina in the Revolution* (1854). He was editorially connected with several periodicals, and filled several political offices.

Simnel (sim'nel), LAMBERT, an impostor who was put forward by a party of malcontent leaders of the York faction early in the reign of Henry VII. He was trained to personate Edward Plantagenet, earl of Warwick, son of the murdered Duke of Clarence. Simnel was crowned at Dublin, and landed with his followers in Lancashire. They were totally defeated near Newark, June 16, 1487, when most of the leaders in the rebellion perished. Simnel ended his days as a domestic in the royal service.

Simoïs (sim'ō-is), a river adjacent to Troy, celebrated by Homer.

Simon (sē-mōṇ), JULES (properly JULES FRANÇOIS SUISSE SIMON), a French philosopher and statesman, born at Lorient, department of Morbihan, Dec. 31, 1814, and educated in the École Normale, Paris. In 1839 he succeeded Cousin as professor of philosophy in the Sorbonne, but lost this post in 1852 by refusing to take the oath of allegiance to Napoleon III. In 1855-56 he delivered a series of philosophical lectures in several towns of Belgium, and in 1863 was returned to the Chamber of Deputies. He strongly opposed the war with Prussia, and after the revolution of September 4, 1870, he became a member of the provisional government, and was minister of education under Thiers from 1871 to 1873. In 1875 he was elected to the senate, and at the same time member of the Academy. In 1876 he became leader of the Republicans, and was minister of the interior until May 16, 1877, when he was dismissed by MacMahon. He afterwards edited the *Echo Universel*. His chief works include *Histoire de l'Ecole d'Alexandrie* (1844), *Le Devoir* (1854), *La Liberté de Conscience* (1859), *L'Ouvrière* (1863), *L'École* (1864), *Le Travail* (1866), *La Peine de Mort* (1869), *Souvenirs du 4 Septembre* (1873), and *Le Gouvernement de M. Thiers* (two vols. 1878). He died June 8, 1896.

Simonides (si-mon'i-dēz), a Greek lyric poet, born in the island of Ceos about B.C. 556. He visited Athens, and after the death of Hipparchus, who had treated him very generously, he proceeded to Thessaly, where he obtained the patronage of powerful families. He subsequently returned to Athens, and at a competition for the best elegy upon those who fell on the field of Marathon, gained the prize over Æschylus himself. When eighty years of age he was victorious in another celebrated poetical contest, which was his fifty-sixth victory of this nature. Shortly after this he was invited to the court of Hiero at Syracuse, where he remained until his death in 467 B.C. at the advanced age of ninety. Simonides is credited with the addition

to the Greek alphabet of the long vowels and the double letters. Only fragments of the works of this poet have come down to us.

Simon Magus (sī'mun mā'gus; that is, the *Magician*), an impostor mentioned in the Acts of the Apostles, a native of Samaria. According to tradition, he went to Egypt, where he studied heathen philosophy and magic. On his return he exhibited his acquired arts as a proof of his divinity. He made many proselytes, and it is said that he was worshiped as a god at Rome. His name has given rise to the term *Simony* (which see). He is regarded as one of the early Gnostics.

Simonoseki (si-mon-o-sek'i), or SHIMONOSEKI, a port and town of Japan, on the southwest point of the Island of Hondo. It is an important depôt station for the transmission of European imports from Nagasaki to the interior, and for the return traffic. Pop. 42,786.

Simony (sim'u-ni), originally meant the sin of buying and selling spiritual gifts, and was so-called from Simon Magus, who attempted to buy the gift of the Holy Spirit from the apostles. In English law it is the crime of trafficking with sacred things, particularly the corrupt presentation of anyone to an ecclesiastical benefice for money or reward. This offense is not punishable in a criminal way at common law, but by an act of Queen Elizabeth it is provided that a corrupt presentation is void, and that the presentation shall go to the crown.

Simoom, SIMOON (si-moom', si-moon'), a hot, suffocating wind that blows occasionally in Africa and Arabia, generated by the extreme heat of the parched deserts or sandy plains. The air, heated by contact with the noonday burning sand, ascends, and the influx of colder air from all sides forms a whirlwind or miniature cyclone, which is borne across the desert laden with sand and dust. Its intense, dry, parching heat, combined with the cloud of dust and sand which it carries with it, has a very destructive effect upon both vegetable and animal life. The effects of the simoom are felt in neighboring regions, where winds owing their origin to it are known under different names, and it is subject to important modifications by the nature of the earth's surface over which it passes. It is called *Sirocco* in South Italy, *Kamsin* in Egypt and Syria, and *Harmattan* in Guinea and Senegambia.

Simplified Spelling, a system of English spelling recently introduced, in which the spelling is simplified in the direction of ease, simplicity and uniformity. A list of over 500 words in common use has been issued, and been adopted in some publications, but by no means generally. The Simplified Spelling Board has published a list of twenty rules for the aid of those who favor the reformed spelling. The first list of 300 spellings was adopted by President Roosevelt in 1906 and the Public Printer ordered to use it in all executive documents, but the objections to the innovation were so great as to lead to withdrawal of the order.

Simplon (sim'plon; Italian *Sempione*), a mountain, 11,117 feet high, belonging to the Alps, in the canton of Valais, Switzerland, and celebrated for the road that passes over it, which commences near Brieg, on the Swiss side, and terminates at the town of Domo d'Ossola, in Piedmont. Begun in 1800 under the direction of Napoleon, it was completed in 1806. It is carried across 611 bridges and rises to the height of 6578 feet. The Simplon tunnel was begun officially July, 1894, and opened to the public Jan. 25, 1906. It is 12½ miles long, costing $15,000,000. The expense was shared by Italy and Switzerland. The tunnel connects the towns of Brigu in Switzerland and Iselle in Italy.

Simpson (simp'sun), SIR JAMES YOUNG, eminent Scottish physician, born in 1811 at Bathgate in Linlithgowshire; died at Edinburgh in 1870. In 1839 he was appointed to the chair of midwifery in the University of Edinburgh. His first paper on chloroform was read before the Medico-Chirurgical Society of Edinburgh on March 10, 1847; the remainder of his life was chiefly devoted to the introduction of anæsthetics. He received honors from numerous scientific societies, and was made a baronet in 1866.

Simpson, MATTHEW, an American bishop of the Methodist Episcopal Church, was born June 11, 1810; died June 18, 1884. He graduated at Madison (now Allegheny) College and took up the practice of medicine, but soon abandoned it to enter the Pittsburgh Conference as a probationer. After preaching in Ohio and Pennsylvania he became vice-president of Allegheny College and then president of Indiana Asbury (now De Pauw) University. In 1852 he was elected a bishop of the Methodist Church. His works include: *A Hundred Years of Methodism*, *Cyclopedia of Methodism*, *Yale Lectures on Preaching*, and *Sermons*.

Simrock (sim'rok), KARL, a German writer, born at Bonn in 1802, studied there and at Berlin, entered the civil service of Prussia at Ber-

lin, was dismissed in 1830 on account of expressing sympathy with the French July revolution; settled at Bonn and devoted himself to literature; was appointed professor of the Old German language and literature in 1850, and died in 1876. Besides writing original poetry, he translated into modern German verse some of the most important of the old German poems, including the *Nibelungenlied*, *Reineke Fuchs*, etc., and altogether rendered great service to the study of the German language and literature.

Sims (simz), GEORGE ROBERT, journalist and dramatic writer, born at London in 1847. He became a contributor to *Fun* under the pen name of 'Dagonet,' and wrote much on the London slums. His most successful dramas are *The Lights o' London*, *The Romany Rye*, and, in collaboration with Henry Pettitt, *The Harbor Lights*, *London Day by Day*, and *The Merry Dutchman*, a comic opera. He also wrote several novels.

Sims, JAMES MARION (1813-83), American surgeon, was born in South Carolina. He studied medicine in Charleston and Philadelphia, specializing in diseases of women. He established a women's hospital in New York; subsequently practised for some years in Europe, organized an Anglo-American ambulance corps in 1870 and had charge of a large hospital in Sedan.

Sims, WILLIAM SOWDEN (1858-), American naval officer, was born at Port Hope, Canada, and was appointed from Pennsylvania to the U. S. Naval Academy, graduating in 1880. He served on the North Atlantic, Pacific and China stations, and was naval attaché to the American embassies at Paris and St. Petersburg (Petrograd), 1897-1900. He became commander in 1907, captain in 1911, rear admiral and president of the Naval War College in 1916, vice-admiral in 1917. After America's entrance into the European war he was placed in charge of all vessels of the United States operating abroad in Atlantic waters. He had been in the war zone as special representative and observer before America entered the war.

Sinai (sī'nā, or sī'nī), properly the general name of a mountain mass in Arabia Petræa, in the south of the peninsula of the same name, which projects into the Red Sea between the gulfs of Akaba and Suez. Sometimes the name is confined to the culminating mountain of the mass, which rises 8551 feet above sea-level. The whole mass is of a triangular shape, about 70 miles long from north to south, and consists of a series of mountains, composed for the most part of granite, syenite, and porphyry, with occasional strata of sandstone and limestone, and intersected by numerous *wadis* or valleys. The principal peaks of the mass are Jebel Zebir, 8551 feet; Jebel Katerin, 8536 feet; Jebel Umm Shomer, 8449 feet; Jebel Músá, 7375 feet; and Jebel Serbál, 6734 feet. From the time of Justinian downwards Jebel Músá, or Mount of Moses, has been almost universally regarded as the mountain of the law.

Sinaitic Codex (sī-na-it'ik), a Biblical MS. written on vellum, and containing a large portion of the *Septuagint*, with the apocryphal books, the whole of the Greek New Testament, with the epistle of Barnabas and a fragment of the *Shepherd of Hermas*. It was discovered in a convent at Mount Sinai by Tischendorf (which see) in 1844-59, and at his suggestion presented to Alexander II of Russia, who caused it to be published in 1862. It probably dates from the fourth century.

Sinaloa (sē-na-lō'a), or CINALOA, a state of Mexico, bordering on the Bay of California; area, 33,671 square miles. The western portion of the state is sandy and barren, but the center is very fertile. The eastern division is traversed by the Mexican Cordilleras. In the fertile districts vegetation is luxuriant, the chief products being sugar, tobacco, cotton, figs, pomegranates, etc. The inhabitants are chiefly engaged in cattle-rearing and mining. Pop. 296,-701.—The capital and chief town is CULIACAN.

Sina'pis. See *Mustard.*

Sin'apism, a mustard poultice.

Sinclair (sing'klar), originally ST. CLAIR, a Scottish family of Norman origin, founded by William de Santo Claro, who settled in Scotland, and received from David I the grant of the barony of Roslin. The earldoms of Orkney, of Caithness, and of Rosslyn have been specially connected with this family, which at one time was one of the most powerful in the kingdom.

Sinclair, CATHERINE, daughter of Sir John Sinclair (see below), born in 1800; died in 1864. She published numerous tales, novels, and books for children, etc., which had an extensive circulation.

Sinclair, SIR JOHN, agriculturist and general statist, was born at Caithness, Scotland, May 10, 1754, and educated at the universities of Edinburgh, Glasgow and Oxford. He was called to both the Scottish and English

bars, but did not practice. He served for many years in parliament and in 1786 was created a baronet. His works include *Statistical Account of Scotland, History of the Public Revenue of the British Empire, Code of Health and Longevity*, etc. He died in 1835.

Sinclair (sin-clār') UPTON, an American author and socialist, born at Baltimore, September 20, 1878. His novel, *The Jungle* (1906), led to a government investigation of the Chicago stockyards. His other publications include *Springtime and Harvest* (1901), *The Industrial Republic* (1907), *The Money-changers* (1908), *Sylvia* (1913).

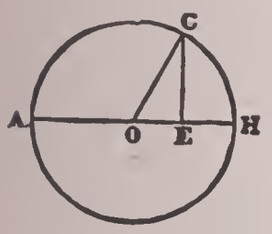
Sind, SINDH, or SCINDE (sind), a province of British India, in the northern part of the presidency of Bombay. It consists of the lower valley and delta of the Indus, and is bounded on the west and northwest by Baluchistan and Afghanistan; northeast by the Punjab; east by Rajputana; and south by the Runn or Ran of Kach and the Indian Ocean; area, 53,000 sq. miles, while the native state of Khairpur, included in the district, has 6000 sq. miles. The chief city and port is Kurrachee or Karáchi, but the ancient capital, Haidarabad, is still a populous town. Flatness and monotony are the great features of Sind. The only elevations deserving the name of mountains occur in the Kirthar range separating Sind from Baluchistan. The plain country comprises a mixed tract of dry desert and alluvial plain. The finest and most productive region lies in the neighborhood of Shikarpur, where a narrow island 100 miles long is inclosed on one side by the River Indus and on the other by the Western Nára. Another great alluvial tract stretches eastwards from the Indus to the Eastern Nára. Sand-hills abound on the eastern border, and large tracts rendered sterile for want of irrigation occur in other parts of Sind. Forests of *Acacia arabica* in some parts stretch along the banks of the Indus for miles, but the forests as a whole are not extensive. The delta of the Indus contains no forests, but its shores and inlets abound with low thickets of mangrove-trees. Herds of buffaloes graze on the swampy tracts of the delta, and sheep and goats abound in Upper Sind. The dryness of the soil, and the almost entire absence of rain, render irrigation very important. Thus the Indus is almost to Sind what the Nile is to Egypt. Numerous irrigation canals, drawn from the main river or its tributaries, intersect the country in every direction. The tilled land yields two crops annually; the spring crop consisting of wheat, barley, grain, oil-seeds, indigo, hemp, and vegetables; the autumn crop of millet, sorghum (the two chief food-grains in Sind), rice, oil-seeds, pulse, and cotton. The native fauna includes the tiger, hyena, wild ass, wolf, fox, hog, antelope, and ibex. Domestic animals include camels, buffaloes, horses, sheep, and goats. Venomous snakes abound, and yearly cause a large number of deaths. The river fisheries of the Indus supply the province with fresh fish, and afford a considerable export trade. The trade of Sind centers almost entirely upon the great seaport of Kurrachee; the chief exports are raw cotton, wool, and grain of various kinds. The climate ranks among the hottest and most variable in India. The leading textile fabrics are coarse silk, cotton, or mixed cloths. The history of Sind is of little interest. It was subdued by the Mongul Emperor Akbar in 1580, since which period it has always been either nominally or really tributary. In 1739 it fell under the power of Nadir Shah, but on his death it reverted to the imperial sway of Delhi. From about the middle of the 18th century it was subordinate to Afghanistan. Civil dissension in the end of the century led to the elevation of the Talpur dynasty of the 'Ameers.' The government then became a wholly unchecked military despotism, upheld by a feudal soldiery. The hostility displayed by the Ameers of Sind towards the British, during and after their operations against the Afghans, led ultimately to its invasion by British troops, and final conquest by Sir C. Napier's victory at Miani in 1843. Sir C. Napier was appointed its first governor, and it was soon after annexed to the presidency of Bombay. Pop. (excluding Khairpur) 3,410,223.

Sindhia, SCINDIAH (sin'di-a), the hereditary title of the head of a Mahratta dynasty ruling in Gwalior, which was founded in 1738 by Ranojee Sindhia, a chief who raised himself from obscurity by his own merits. He died in 1754. In 1781 Madaji Sindhia negotiated a peace between the British and the Mahrattas, and having introduced European discipline and tactics into his army, possessed himself of Delhi, Agra, and the person of the Mogul emperor, in whose name he subsequently acted. He was the most powerful member of the Mahratta confederacy.

Sinding (sin'ding), CHRISTIAN 1856-), a Norwegian composer, born at Königsberg. He studied at Dresden, Munich and Berlin, and settled as organist and teacher at Christiania. He has written a great number of compo-

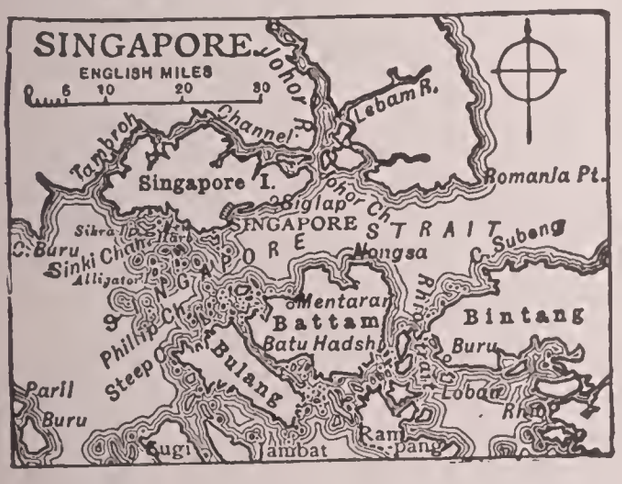
sitions for the piano, as well as sonatas and concertos for the violin and flute. His opera, *Heilige Berg*, was given in 1910.

Sine (sīn), in trigonometry, a line drawn perpendicularly from one end of an arc of a circle upon the diameter, drawn through the other end. The sine of the arc is also the sine of the angle subtended by the ark; that is, CE is the sine of the arc CH and the angle COH.



Singan (sē-ngän′), the capital of the province of Shen-si, China.

Singapore (sin-ga-pōr′), a British possession, forming one of the Straits Settlements, and consisting of a small island, lat. 1° 17′ N.; lon. 103° 50′ E.; and its capital of same name, with numerous surrounding islets, off the southern extremity of the Malay Peninsula, and separated from the mainland by a narrow strait 2 miles to ½ mile in breadth. The principal island, which is elevated and well clothed with wood, is about 25 miles long and 14 miles average breadth; area, 206 square miles. The climate is hot, the average summer heat being 84°, and the winter temperature 76°. The annual rainfall averages about 102 inches. Though so near the equator the island is remarkable for its salubrity. Agricultural products include nutmegs, cloves, ginger, pepper, sugar-cane, pumpkins, cucumbers, yams, sweet-potatoes, onions, garlic, and other vegetables. Singapore possesses all the fruit-bearing trees of the Indian Archipelago. A delicate sea-weed called *agar-agar* is an important article of commerce for China and the eastern markets. Tigers swarm in the jungles. Birds include pea-fowls, pheasants, partridges, etc. Among reptiles are turtles, tortoises, crocodiles, cobras and other serpents. The coast and rivulets abound with quantities of fish.—The town of Singapore is situated on the south side of the island. It is divided into three parts—the western, inhabited by Chinese; the central, by the Europeans; and the eastern, by the Malays. The central part is laid out in regular streets, lined with substantial brick houses. Here are the principal public offices, official residences, hotels, exchange, and churches. The harbor is commodious, and is now being strongly fortified. A special dock for the use of the navy is also being constructed. Singapore is the great entrepôt of Southern Asia and the Indian Archipelago. The port is perfectly free; no duties are levied upon anything. Exports consist of tin, coffee, rice, sago, tapioca, pepper, nutmegs, rattans, gambier, sugar, bees'-wax, raw silk, gutta-percha, mother-of-pearl, etc. Imports from Great Britain include cottons, woolens, coals, iron, arms, wines, and various manufactures; and from Europe and the United States, wines, spirits, liquors, manufactured goods, provisions, etc. Singapore is the capital of the Straits Settlements, and the residence of the governor. Its botanical garden is one of the finest in the world. In 1819 the British obtained permission to build a factory on the southern shore of the island; and by treaty in 1824 purchased from the Sultan of Johore in the Malay Peninsula opposite the fee-simple of the island. Pop. 303,321. See *Straits Settlements.*



Singhalese. See *Ceylon.*

Singhara Nuts (sin-ga′ra), the name in India for the edible fruits of *Trapa bispinōsa.* See *Trapa.*

Singhbhum (sing-böm′) a British district in Bengal, India; area, 4563 square miles. The inhabitants are almost all hill tribes, who formerly gave the British much trouble. Pop. 813,579.

Singing. See *Voice.*

Singing Flames. A small gas flame, when surrounded by a glass tube, produces a musical note which depends on the length of the tube, just as the note from an organ-pipe depends on the length of the pipe. According to Faraday this is due to the extremely rapid explosions of the burning gas strengthened into musical notes by the resonance of the glass tubes.

Single Tax, a system of taxation proposed by Henry George (which see), in his book entitled *Progress and Poverty.* He proposed to

abolish all taxation except on land values, arguing in favor of the collection of all revenue from this single source. The tax was to be laid on the land alone, without regard to any improvements upon it, though dependent upon the enhanced value which it may have gained from position, in a city or otherwise, this being denominated the 'unearned increment' of value. This unearned increment, he asserts, is a natural growth, not due to any act of the owner, but born of the general advance of civilized conditions, and for this reason belonging to society as a whole instead of to individuals. The George theory has given rise to Single Tax associations in this and other countries, which vigorously maintain the doctrine.

Sing-Sing, the former name of Ossining (which see).

Sinigaglia (sin-i-gäl'yä; anciently *Sena Gallica*), a seaport in the province of Ancona, Italy, on the Adriatic. It has a small harbor and a considerable fishing trade, and is frequented for sea-bathing. Sinigaglia was founded by the Senonian Gauls, and received a Roman colony in B.C. 289. It now presents quite a modern aspect. Pop. 5635.

Sinister (sin'is-ter), in heraldry, a term which denotes the left side of the escutcheon.

Sinking Fund, a term originally applied to a scheme by which it was expected to bring about the gradual extinction of the British national debt. This scheme was first projected in 1716 by Sir Robert Walpole. The principle of the sinking fund is now in use in various governments and corporations, for the purpose of paying off accumulated debts, and with more or less success in accordance with the judgment shown in its management.

Sinn Fein (shin fān), the motto and name of an Irish society (meaning 'Ourselves Alone'), founded in 1905, having for its aim the recovery and assertion of the Irish nationality. It was under the leadership of Arthur Griffith, a brilliant journalist. The Nationalist party was opposed to the Sinn Fein movement and clung to the possibility of compromise with England, while the Sinn Fein was radical, demanded an absolute break, the complete severance of Ireland from British control, the revival of the Irish language, dress, and so forth. During the discussion of the Home Rule Bill in 1913 the Sinn Fein party rose to power and associated itself with the Irish Volunteer movement, paralleling the Ulster Volunteer movement. The rebellion of 1916 (see *Ireland*) was engineered by the Sinn Fein, some of whose leaders were executed and others imprisoned. Again, in 1918, the British authorities interned a number of prominent Sinn Feiners.

Sinope (si-nō'pē; Turkish, *Sinoub*), a seaport of Asiatic Turkey, situated on the neck of land connecting the rocky peninsula of Cape Sinope, in the Black Sea, with the mainland, 350 miles E. N. E. of Constantinople. It possesses a fine harbor, and has a naval arsenal and a building-yard. On November 30, 1853, eighteen Russian ships attacked and destroyed a Turkish flotilla in the harbor. Sinope is an ancient Greek town, and was the birthplace of Diogenes and capital of Mithridates the Great. Pop. 9749.

Sinople (sin'ō-pl), red ferruginous quartz, of a blood or brownish red color, sometimes with a tinge of yellow. It occurs in small very perfect crystals, and in masses resembling some varieties of jasper.

Sinter (sin'ter), incrustations on rocks, derived from mineral waters. Various adjectives are prefixed to the name in order to indicate the nature of the deposit; thus we have *calcareous* sinter, *siliceous* sinter, *ferruginous* sinter, etc.

Sinus (sī'nus), in anatomy, a term applied to cavities in certain bones of the head and face, and also to certain venous canals into which a number of vessels empty themselves. In surgery, a sinus is an unnatural suppurating canal which opens externally. When it communicates internally with one of the normal canals or cavities of the body it is usually termed *fistula*.

Sion (sē-ōn; German, *Sitten;* ancient, *Sedunum*), capital of the canton of Valais, Switzerland, picturesquely situated near the right bank of the Rhone, 58 miles east of Geneva. It has narrow streets, a Gothic cathedral (end of fifteenth century), episcopal palace, seminary for priests, etc., and is overlooked by two hills crowned by ruined castles. Pop. 6048.

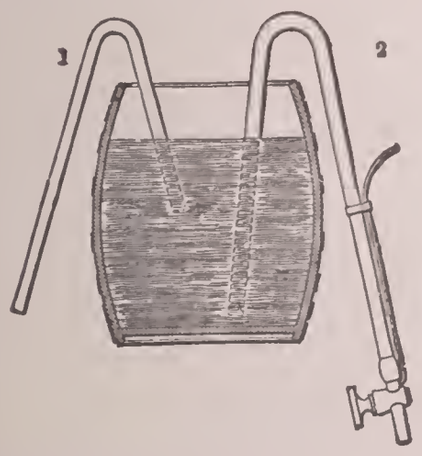
Siout (si-öt'), SIUT or ASSIOOT, the capital of Upper Egypt, near the left bank of the Nile, 229 miles from Cairo by rail. The streets are narrow and unpaved, and the houses are generally mere hovels. It has several handsome mosques, bazaars, and baths. It is celebrated for its red and black pottery, which finds a market all over Egypt. It is much frequented by caravans from the interior of Africa, and the trade with the Sudan has been renewed since the rebellion of the Mahdi was crushed. Pop 42,087.

Sioux (sö) or DAKOTA INDIANS, a family of Indian tribes dwelling to the west of the Mississippi, and originally extending from Lake Winnipeg on the north to the Arkansas River on the south. They have several times engaged in hostilities with the United States settlers and troops, chiefly because faith was not kept with them by the government. In 1862 more than a thousand settlers were killed. In 1876 a body of them who had taken up a position in the Black Hills (which see) defeated the United States troops under Gen. Custer. They number about 25,000.

Sioux City, the county seat of Woodbury Co., Iowa, on the Missouri River, near the junction of Iowa, Nebraska and South Dakota. It is the seat of Morningside College and Trinity College. In the packing and livestock industry it is sixth in the United States. There are over 300 factories doing a business of $175,000,000 annually, and 350 jobbing houses with a business of $200,000,000. Pop. (1910) 47,828; (1920) 71,227.

Sioux Falls, a city, county seat of Minnehaha Co., South Dakota, on the Big Sioux River. Seat of Sioux Falls College. It is a manufacturing and jobbing center and there are extensive stone quarries. Pop. (1910) 14,094; (1920) 25,176.

Siphon (sī'fun), a bent pipe, one leg of which is longer than the other, through which a liquid may, by the action of gravity, be transferred from



1, Common Siphon. 2, Improved Siphon, with exhausting tube for filling it.

one place to another at a lower level over an obstruction which must be lower than a height which depends on the specific gravity of the liquid. In order to accomplish this the shorter leg is plunged into a vessel containing liquid, and the air in the tube is now exhausted by being drawn through the longer leg, whereupon the liquid will flow out of the vessel through the siphon until the surface of the liquid is brought down to the level of the opening of the short leg of the siphon. The water rises by the weight of the atmosphere, and the leg by which it is discharged must always be longer than the other to give a greater weight of water in this leg. Sometimes an exhaust tube is attached to the longer leg for the purpose of exhausting the air by motion and causing the flow to commence; but an equally effectual method is to fill the tube with liquid and then to put it in position while still full, the ends of course being at first stopped. The principle of the siphon has been employed in aqueducts and in drainage works, and is being used on a large scale in the construction of the new aqueduct for the supply of New York city. Water can be siphoned to a height of 32 feet. The chief ordinary use of the siphon is for racking wines and liquors from off their lees.

Siphon, the name applied in zoölogy to the tubes through which water has egress from, and ingress to, the respiratory or breathing organs of certain univalve and bivalve molluscs.

Siphon Barometer. See *Barometer.*

Siphonophora (sī-fon-of'o-ra), a subclass of Hydrozoa, otherwise named Oceanic Hydrozoa, delicate organisms, generally provided with 'swimming bells.'

Siphonostomata (sī-fon-os-tom'a-ta), the division of gasteropodous molluscs, of which the whelk is an example. The shell possesses a notch or tube for the emission of the respiratory siphon.

Sipunculus (sī-pun'kū-lus), a genus of Annulosa, often placed among the echinoderms, and including the spoon-worm (which see).

Sir, as a title, belongs to knights and baronets, and is always prefixed to the Christian name.—*Sire* is a term of respect by which kings are addressed. The word *sir* is the same as *sire*, and is derived from the old French *senre*, and that from *senior* (Latin, elder), whence also *seignior*, *signor*, similar terms of courtesy.

Sirajganj (sē-raj-ganj'), a town of India, in Pabna district, Bengal, and the most important river mart in the province. It is situated near the main stream of the Brahmaputra. It was formerly an important jute center or market. Pop. 23,114.

Sir-Daria, a Russian district, Central Asia, which lies on both sides of the river Jaxartes or Sir-Daria

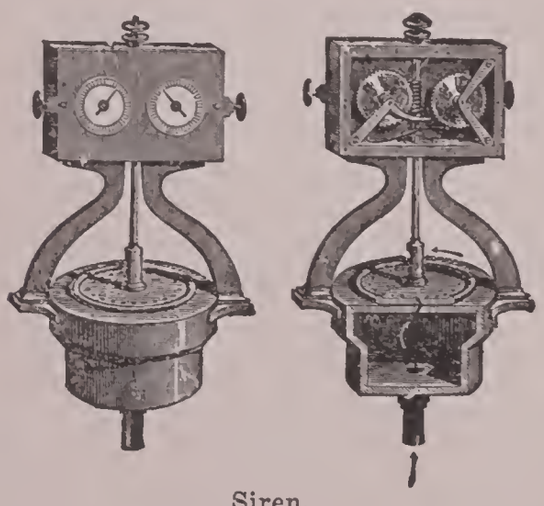
area, 194,853 square miles; pop. 1,479,848. The chief town is Tashkend.

Sir-Daria, JAXARTES, or SIHON, a river in Central Asia, which rises in the western slope of the Thian Shan Mountains, and flows through the Russian districts of Ferghana and Sir-Daria into the northeast side of Lake Aral, after a tortuous course of about 1200 miles. It is of little value for navigation, but is largely used for irrigating the oases of Turkestan.

Siredon (si-rē'don), the axolotl (which see).

Siren (sī'ren), or MUD-EEL, a genus of amphibian vertebrates, belonging to the perennibranchiate section of the order Urodela. The *Siren lacertina* of the United States is the familiar species. It is dark brown in color, and has two front limbs, each with four toes. The average length is about 3 feet. There are three external gill-tufts, and the tail is long and slender. It inhabits the rice-swamps of South Carolina. It prefers damp muddy situations, and feeds upon worms and insects.

Siren (sī'ren), an instrument for producing continuous or musical sounds, and for measuring the number of sound waves or vibrations per second, which produce a note of given pitch. In its original form it consists of a disc with a circular row of oblique holes, revolving close to the top-plate of a wind-chest perforated with corresponding holes of a



Siren.

contrary obliquity, so that the jets of air from the latter passing through the former keep the disc in motion, and produce a note corresponding to the rapidity of the coincidences of the holes in the two plates, the number of coincidences or vibrations in a given time being shown by indices which connect by toothed wheels with a screw on the axis of the disc. See also *Fog-signals.*

Sirenia (sī-rē'ni-a), an order of marine herbivorous mammals, allied to the whales, having the posterior extremities wanting, and the anterior converted into paddles. They differ from the whales chiefly in having the nostrils placed in the anterior part of the head, and in having molar teeth with flat crowns adapted for a vegetable diet. They feed chiefly on sea-weeds, and frequent the mouths of rivers and estuaries. This order comprises the manatee and dugong (which see).

Sirens (sī'renz), in Greek mythology, the name of several sea nymphs, who by their singing fascinated those who sailed by their island, and then destroyed them. When Ulysses approached their island, which was near the coast of Sicily, he stuffed the ears of his companions with wax, while he bound himself to the mast, and so they escaped. The Sirens then threw themselves into the sea, where they became formidable rocks. Another story is that they threw themselves into the sea because vanquished in music by Orpheus.

Sirikul (si-ri-köl'), a lake on the Pamir plateau, Central Asia, 15,000 feet above the sea. It is about 14 miles long by 1 mile broad, and is the source of the chief branches of the Amu Daria or Oxus.

Sirinagur. See *Srinagar.*

Siripul (si-ri-pöl'), a town in Afghan Turkestan, 100 miles S. W. of Balkh. The inhabitants are chiefly Uzbeks. Pop. about 18,000.

Sirius (sir'i-us), the brightest star in the heavens, also called the Dog-star, situated in the mouth of the constellation Canis Major, or the Greater Dog. It is estimated to have more than 12 times the sun's magnitude. See *Dog-days.*

Sirocco (si-rok'ō), a hot, relaxing, and oppressive southeast wind, which blows in Sicily and South Italy. See *Simoom.*

Sirohi (sē-rō'hē), a native state in the Rajputana Agency, India; area, 1964 square miles. The country is much intersected and broken up by hills and rocky ranges, and frequently suffers from drought. Wheat and barley are the staple crops. Pop. 154,544.

Sirsá (sir'su), a British district in the Punjab, India; area, 3004 square miles. It forms for the most part a barren and treeless plateau. A great cattle fair is held at Sirsá, the chief town, in August and September. It has manufactures of cotton cloth and pottery. Pop. 253,275; of town, 15,800.

Sisal (sis'al), or GRASS HEMP, a species of agave yielding a valuable fiber, a native of Mexico, Honduras, Central America, and specially cultivated in Yucatan. It is grown upon stony ground, and the leaves, from which the fiber is prepared, are between 2 and 3 feet long. The pulp is cleaned away from each side of the leaf and the remaining fiber is then washed and sun-dried. It has considerable commercial value in the manufacture of cordage and coarse cloth.

Siscowet (sis'ko-wet), or SISKOWIT (*Salmo siscowet*), a species of North American lake-trout, inhabiting chiefly the deep water of Lake Superior and other lakes.

Siskin (sis'kin; *Fringma spinus*), a species of European finch, the plumage of which is chiefly green, particularly on the back and upper parts, with yellow patches on the neck, breast, and behind the ear. These birds are usually seen in small flocks, haunting the margins of streams, and feeding on the seeds of rushes, elder-trees, and other plants. The siskin has a pleasant song, and when interbred with the canary produces a hybrid progeny with a sweet mellow song.

Sismondi (sis-mon'di), JEAN CHARLES LÉONARD SIMONDE DE, historian and political economist, the son of a Protestant minister, was born in Geneva, May 9, 1773, and educated at the college of that town. In 1793 the overthrow of the government compelled him to flee with his father to England. On his return, two years after, he was imprisoned, and lost the greater part of his property by confiscation. Similar persecution followed him even in Tuscany, whither he proceeded in 1795; but at length, on his return to Geneva in 1800, he was allowed to live in quietness. His first published work appeared in 1801, and was entitled *Tableau de l'Agriculture Toscane.* In 1803 he published a work entitled *De la Richesse Commerciale, ou Principes d'Economie Politique appliquée à la Législation du Commerce.* This essay was afterwards remodeled so as to form the groundwork of his treatise published in 1819 under the title of *Nouveaux Principes d'Économie Politique.*

In 1807 appeared the first two volumes of his *Républiques Italiennes*, which ultimately reached sixteen volumes, and was not completed till 1818. In 1819 he commenced his *Histoire des Français*, a great work which was to occupy the greater part of his remaining life. He died of cancer, June 25, 1842. His chief works, besides those mentioned, were *De la Littérature du Midi de l'Europe* (four vols., Paris, 1813-29); *Histoire de la Renaissance de la Liberté en Italie* (two vols., Paris, 1832); and *Histoire de la Chûte de l'Empire Romain et du Déclin de la Civilisation de 250 à 1000.*

Sissoo. See *Dalbergia.*

Sisterhood (sis'tẽr-hụd), a name given to various religious and charitable orders or associations of women. These are very numerous, and have recently increased in number. Among the more important are: — (1) Sisters of Charity (also called Gray Sisters, Daughters of Charity, Sisters of St. Vincent de Paul), a Roman Catholic order founded in 1634 at Paris by St. Vincent de Paul for the work of nursing the sick in hospitals. The sisters take simple vows of poverty, chastity, and obedience, which are annually renewed; they add a fourth vow binding themselves to serve the sick. They number about 7000 in upwards of 600 houses scattered over all parts of the civilized world. Besides nursing and conducting orphanages, the sisters sometimes undertake the management of poor schools. (2) Sisters of Charity (Irish), a congregation in no way connected with the above, founded in 1815 by Mary Frances Aikenhead, for the purpose of ministering to the sick and poor in hospitals, and at their own homes. The vows are perpetual; the rule is that of the Society of Jesus so far as it is suitable to women. The order has twenty-two houses in Ireland. (3) Sisters of Charity of St. Paul, an order founded by M. Chauvet, a French curé in 1794. These teaching sisters were introduced into England in 1847, and have now upwards of fifty houses there. (4) Sisters of Mercy, an important and flourishing order, founded by Catherine M'Auley at Baggott Street, Dublin, in 1827, for carrying on works of mercy both spiritual and corporal. Other associations receive the same name. They have been introduced into the United States, both in the Roman Catholic and the Protestant Episcopal churches. See *Mercy (Sisters of).*

Sisters of Charity, Etc. See *Sisterhoods.*

Sistine Chapel (sis'tēn; *Capella Sistina*), a chapel in the Vatican, so called from Pope Sixtus IV, by whom it was erected in 1473. See *Vatican.*

Sistova (sēs-tō'vȧ), a town and port of Bulgaria, 35 miles S. W. of Rustchuk, on the right bank of the Danube. It is poorly built, but has an active trade and is an important commercial center. Pop. 13,408.

Sistrum (sis'trum), a kind of rattle or jingling instrument used by the ancient Egyptians in their religious ceremonies, especially in the worship of Isis. It consisted of a thin, somewhat lyre-shaped, metal frame through which passed loosely a number of metal rods, to which rings were sometimes attached.

Sistrum.

Sisyphus (sis'i-fus), a mythical king of Corinth, who promoted navigation and commerce, but was fraudulent, avaricious, and deceitful. For his wickedness he was punished in the nether world, being obliged to roll a heavy stone to the top of a hill, on reaching which it would always roll back again.

Sitapur (sē-tä'pör), a division of British India, prov. of Oudh, Northwestern Provinces; area, 7555 sq. miles; pop. 2,777,803. Also, a district of this division; area, 2551 square miles. Pop. 958,251.—SITAPUR, the capital of the district, is picturesquely situated on the Saráyan River. Pop. 22,557.

Sitka (sit'kå), or NEW ARCHANGEL, until recently the capital of Alaska, on the west coast of Baranoff Island. It has a small but commodious harbor. The inhabitants are chiefly engaged in catching and curing salmon. Pop. (1910) 1039.

Sitophobia (sī-tō-fō'bi-å), the morbid fear of food or of a particular kind of food which is now a recognized disease. The fear may be ascribed to temperament, to education or to environment.

Siva (sē'va), the name of the third deity in the Hindu triad (Brahma, Vishnu and Siva), in which he is represented as the destroyer and also as the creator or regenerator. His worshipers (the most numerous of the Brahmanic sects) are termed Saivas, and assign to him the first place in the trinity, attributing to him also many attributes which properly belong to the other deities. His symbol is the *lingam* or *vhallus*, emblematic of creation. He is frequently represented riding on a white bull, with five faces and two, four, eight, or ten hands, having a third eye in the middle of his forehead pointing up and down, and carrying a trident. Serpents commonly hang about him, and he may be seen with a sort of mace in one hand and an antelope in another. See *Brahmanism*.

Siva.

Sivas (sē-väs'; anciently *Sebaste*), a town in Asiatic Turkey near the center of a large and fertile plain watered by the Kizil Irmak, 410 miles E. S. E. of Constantinople. It has numerous mosques, large and well-supplied bazaars, commodious khans, baths, etc. Being on the road from Bagdad, and having easy access to the Black Sea, it commands a considerable trade. Pop. about 50,000.

Sivash (sē-vash'), or PUTRID SEA, a lagoon on the N. E. border of the Crimea, South Russia, separated from the Sea of Azov by a narrow strip of land called the Tongue of Arabat. In summer and autumn it becomes a vast marsh giving off pestiferous vapors, hence its name.

Sivatherium (siv-a-thē'ri-um), an extinct genus of ruminant animals, the fossil remains of which occur in the Pliocene Tertiary deposits of the Siwalik Hills in Hindustan. A single species (*S. giganteum*) only has been determined. It surpassed all living ruminants in size. It had four horns and a protruding upper lip, and must have resembled a gigantic antelope or gnu.

Siwah (sē'wä), or AMMON, an oasis in Egypt, 320 miles W. S. W. of Cairo, 78 feet below the sea-level; 6 miles long by 5 miles broad. It abounds in date-trees, yielding fruit of very superior quality. Here are the ruins of the ancient temple of Jupiter Ammon Many of the sculptures, including figures of Ammon, with the attributes of the ram-headed god, still remain. Pop. (1907) 3884.

Six Articles, STATUTE OF, a law made by 31 Henry VIII chap. xiv., and styled An Act for Abolishing Diversity of Opinions. It was passed on June 7, 1541, and came to be commonly known as the *bloody statute*. It enacted that if anyone did deny the doctrine of transubstantiation (1), he should be burned; and that if anyone preached, taught, or obstinately affirmed or defended that the communion in both kinds was necessary (2), or that priests might marry (3), or vows of chastity be broken (4), or private masses not used (5), or that auricular confession was not

expedient (6), it should be felony. The act was at first vigorously enforced; but after undergoing some mitigation in 1544, it was finally repealed in 1549.

Sixtus V (FELIX PERETTI), the greatest ruler and statesman among the popes of the last four centuries, was born in 1521 near Montalto; died in 1590. He entered the Franciscan order in 1534, and distinguished himself in scholastic philosophy, theology, and Latin literature. In 1544 he taught the canon law at Rimini, and two years later at Siena. In 1548 he was made priest, doctor of divinity, and superintendent of the monastic school at Siena. In 1556 he was appointed director of the Franciscan school at Venice, and afterwards inquisitor-general. In 1560 he went to Rome, where the pope conferred upon him several dignities. In 1570 he was created cardinal, and took the name Montalto. Under Gregory XIII he lived a retired life for some years in his villa, and is said to have assumed the mask of pious simplicity and old age in order to prepare himself for the papal chair. On Gregory's death in 1585 he was unanimously elected pope, and immediately manifested himself an able and energetic ruler. He restored order in the States of the Church, cleared the country of bandits, and regulated the finances. He reëstablished discipline in the religious orders, and fixed the number of cardinals at seventy. He took a part in most of the great political events then agitating Europe. He supported Henry III against the Huguenots, and Philip II against England. The great aim of his foreign policy was the promotion of the cause of Roman Catholicism throughout Europe against Protestantism.

Sizar (sī'zär), a term used in the University of Cambridge, and at Trinity College, Dublin, to denote a class of students of limited means who usually receive their commons free and are pecuniarily assisted otherwise. They were originally required to perform certain duties of a menial character, but this practice has long ago fallen into desuetude. The corresponding class of students in Oxford are called servitors.

Size. See *Glue.*

Sjælland (syel'lân). See *Zealand.*

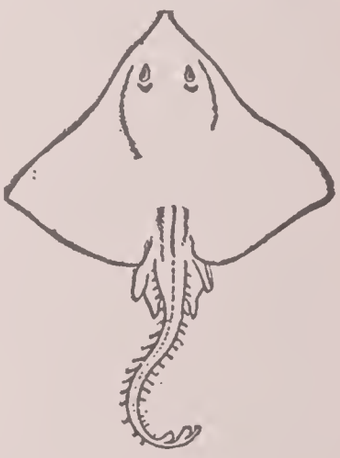
Skagen (skä'gen), CAPE, or THE SKAW, the extreme northern point of the province of Jutland, Denmark. A lighthouse, 67 feet high, built by Frederick II in 1564, is situated on the cape. The village of Skagen, close by, has 2000 inhabitants.

Skager-Rack (skä'ger-rák), a broad arm of the German Ocean, which washes Norway on the north, Jutland on the south, and Sweden on the east, where it communicates with the Cattegat; length, W. S. W. to E. N. E., about 150 miles; breadth, 80 miles. Its depth varies from 30 to upwards of 200 fathoms. There are several good harbors on the Norwegian and Swedish coasts.

Skalds. See *Scalds.*

Skagway, (skag'wā), a town on Chilkat Inlet, Alaska; at the head of Lynn canal, and at the entrance to the White Pass. It is a result of expeditions to the Yukon gold fields in 1897, when the White Pass began to be used as a means of reaching the Klondike and its vicinity. In 1899 the first college in Alaska was opened here. Its name is derived from the Indian name of a river which flows into the sea near the town. A post-office was established here in 1897. Pop. 3117.

Skate (skāt), a name popularly applied to several species of the genus of fishes *Raia* or rays. The skeleton is cartilaginous, the body much depressed, and more or less approaching to a rhomboidal form. The common skate (*Raia batis*) agrees with the other members of the genus *Raia* in possessing a flat broad body, the chief portion of which is made up of the expanded pectoral fins, which are concealed, in a manner, under the skin. The tail is long and slender, and the snout pointed, with a prominent ridge or keel. The teeth are arranged in a mosaic or pavement-like pattern. This fish, although commonly seen of moderate dimensions, may attain a weight of 200 lbs. or more.



Skate
(*Raia marginata*).

Skate Leech, a large, spinose, greenish leech, *Pontobdella*

Skate Leech
(*Pontobdella muricata*).

muricata, which is found as a parasite upon skates and sharks.

Skate, Skating (skāt). A skate consists of a frame shaped somewhat like the sole of a shoe, underneath which is fastened a metallic runner, the whole being intended to be fastened, one under each foot, for gliding rapidly over the ice. Skating seems to be of great antiquity, mention being made of it in the *Edda*, the first skates used being bones tied to the shoes. In Holland, from time immemorial, skates have been used by all classes of people upon the canals and rivers for the facility of locomotion they afford. Great variety in the manufacture of skates has been introduced within a comparatively short period. In the United States about 1865 the skate in general use had a broad iron or steel runner curled up in front of the toe, and fitted with a wooden body-piece in which were slots through which the straps passed. A skate of this kind is still in use to some extent in England, but in the United States it has given way to the steel club-skate, in which the strap is no longer used. This has a runner slightly curved on the skating edge and securely riveted to sole and heel plates in which are slots for adjustable clamps, which are made to grip the sole and heel of the shoe by means of a screw and toggle-lever mechanism. The British and German forms of skates have much lower and flatter runners than those used in this country. The Norwegians use the skee, or snowshoe, more than the skate, and this is also in common use in Canada, where the broad reaches of snow render it preferable. A kind of skates, formerly known as parlor skates, but now, from their common out-door use, usually called roller-skates, is widely in use on pavements and asphalt streets or floors. In these the runner is replaced by four small wheels, attached to a wooden base, which is strapped fast to the shoe. A road-skate, having two wheels, is now in use in England. These are 4 inches in diameter and have rubber tires. There is another 3-wheeled form which resembles a little triangle.

Skeat (skēt), Walter William, philologist, was born at London in 1835, was educated at King's College School, London, and Christ's College, Cambridge, became a clergyman and in 1878 was elected professor of Anglo-Saxon at Cambridge. He published editions of many early English works, but is best known for his *Etymological Dictionary of the English Language* (1879-82), which marked an epoch in this branch of knowledge, and was published in an abridged form as a *Concise Etymological Dictionary of the English Language*. He died October 7, 1912.

Skeleton (skel'e-tun), the name applied specially to the hard structures, mostly of bony or osseous nature, which form the internal axis or support of the soft parts in the higher or vertebrate animals. But in comparative anatomy the term *endoskelcton* is applied to the internal hard parts, proper to the Vertebrata, while *cxoskeleton* denotes the exterior hard parts both of Vertebrates and Invertebrates, such as the shell of lobster, scales of fishes, etc. The parts of any endoskeleton may generally be grouped under the two heads of the spinal or *axial* skeleton, and the *appendicular* parts. The former includes the skeleton of the head and trunk, the latter that of the limbs. The spinal skeleton involves the consideration of the *skull; spinal* or *vertebral column*, composed of its various *vertebræ;* and of the *thorax*, or *chest*, and *pelvis*. The limbs consist of homologous or corresponding parts, and are attached to a series of bones constituting the 'arch,' or support of the upper or fore and the lower or hind limbs respectively. The scapulæ or shoulder blades and collar bones or *clavicles* constitute the shoulder-girdle or arch supporting the fore or upper limb, while the lower limb is attached to the pelvic arch or pelvis. See *Skull, Spine, Thorax, Rib, Shoulder, Arm, Hand, Pelvis, Leg, Foot*, etc.

Skelligs (skel'igz), The, three rocky islets off the southwest coast of Ireland, west of Bolus Head, county Kerry. There is here a lighthouse, visible 18 miles.

Skelton (skel't'n), a town of England, North Riding of Yorkshire, district of Cleveland, with extensive iron mines. Pop. (with Brotton) 15,202.

Skelton, John, an English poet, born about 1460, probably at Norfolk. He studied at both Oxford and Cambridge, and from the former received the laureateship (then a degree in grammar). He was tutor to the Duke of York, afterwards Henry VIII; was rector of Diss and curate of Trompington in 1504, and was appointed *orator regius* to Henry VIII. His satirical attacks incurred the resentment of Wolsey, and Skelton had to take refuge in the sanctuary at Westminster, where the abbot afforded him protection until his death, in 1529. His works comprise among others the drama or morality of *Magnyfycence;* a satire on Wolsey, entitled *Why Come Ye Not to Courte?* the *Tunning* (that is 'the brewing') of

Elynor Rummyng, a humorous picture of low life; and the *Book of Phylyp Sparrow.*

Skene (skēn), WILLIAM FORBES, archæologist, was born in 1809 at Inverie, Kincardineshire, was educated at the high school, Edinburgh, and in 1831 became a writer to the signet. From that time on he devoted his leisure to archæological and historical research. His chief works include *The Highlanders of Scotland, Their Origin, History, and Antiquities; The Four Ancient Books of Wales;* and *Celtic Scotland, a History of Ancient Alban.* Besides the above he edited various ancient Scottish works. In 1881 he was appointed historiographer royal of Scotland. He died in 1902.

Skew-bridge (skū'brij), a species of bridge which, instead of crossing a road or river at right angles to its course, makes an oblique angle with it, in order that the continuity of the road may be preserved.

Ski (skī), large snow-shoes used in Norway and other far-north countries. They are narrow, skate-like gliders, about 8 feet long, necessary for travel during the months of deep snow. Children are trained in their use, and village competitions are held for speed, style and leaping. The ski has become common in Canada and in parts of the northern United States, where 'ski running' has become a popular winter sport, ski tournaments being held.

Skiagraph (skī'a-graf), a photographic picture obtained by means of the Roentgen rays; known also as shadowgraph and radiograph. A *skiascope* is an apparatus for making observations of the influence of Roentgen rays on a fluorescent screen, enabling an observer to see through opaque substances when penetrated by these rays.

Skiathos (skī'a-thos), a small island in the Grecian Archipelago, off the southeast coast of Thessaly, north of Eubœa, rising to the height of 1400 feet. Pop. 3200.

Skid, or **Skeed,** an iron shoe or socket for checking the speed of a carriage when going down hill; it is attached to the carriage by a chain of such length as will permit the wheel to ride on it instead of revolving. Also a square piece of timber on which something is supported or along which it may be rolled. In nautical language, a skid is a beam of timber used as a support for some heavy body, to prevent its weight falling on a weak part of the vessel's structure. Also timbers that are laid crosswise in a ship's waist, to sustain the larger boats, the launch in particular.

Skiddaw (skid'dą), a mountain mass in the county of Cumberland, England, distinguished for its grand and romantic scenery; height, 3054 feet. It is 3 miles north of Keswick.

Skien (skēn), a town of Southern Norway, 65 miles S. W. of Christiania, on river of same name. Pop. 11,343.

Skimmer, same as *Scissor-bill* or *Shearwater.*

Skin, the name given to the external layer or tissue of the bodies of most animals, forming at the same time a protective and a blood-purifying organ. Structurally viewed, the skin of all vertebrates consists of *two* layers — an outer and inner layer. To the outer layer the name of *cuticle, epidermis,* or *scarf skin* is popularly given. This layer is destitute of nerves and of blood-vessels, and is thus a non-sensitive structure. The inner layer is, on the contrary, a highly vascular and sensitive layer, and is named the *dermis, corium,* or *true skin.* At the lips and elsewhere the epidermis becomes continuous with the more delicate *mucous membrane* which forms the lining membrane of the internal passages. This membrane is to be viewed, however, as a mere modification of the epidermis itself. The epidermis is composed of several layers of epithelial cells. The upper cells of the epidermis, as seen in a vertical section of the skin, are flattened, and of scaly conformation, the lower cells being of rounded or elongated shape. The elongated cells have their long axes arranged vertically to the general skin surface. The deeper portion of the epidermis, or *rete mucosum,* is of softer and more opaque consistence and appearance than the upper layer; and it is in the rete mucosum that coloring matters are present, which give the hue to the skin. The *dermis* or true skin rests upon a layer of adipose and cellular tissue, and is composed of interlacing fibers of fibro-cellular tissue. It is richly supplied with blood-vessels, so that when cut it bleeds; and nerve fibers are likewise disposed in it, conferring sensibility. The surface of the true skin is thrown into a series of elevations, papillæ, or minute prominences, which are specially rich in capillary blood-vessels and nerve endings, and which are thus particularly vascular and sensitive. The special glands of the skin are the sudoriparous or sweat glands; they are in the form of tubes coiled up into balls, and the total number of them in the human skin is estimated at over two millions. There are also sebaceous

glands, which secrete an oily fluid useful for lubrication. Though the most ostensible function of the skin seems to be that it covers in and protects the more delicate structures that lie beneath it, its functions as an excretory organ and as a regulator of the temperature of the body are also of high importance. The hair and nails are modifications of the epidermis, as are also the feathers of birds and the claws of animals. Extensions of skin, as between the toes of ducks, etc., or between the arms and legs of flying squirrels, and as seen in bats, may exist. And pendulous skinfolds, horns, callosities, horny plates, scales, and other modifications of the epidermis, are met with in various animals. The *scutes* or bony plates seen in the armadillos are dermal structures united to horny plates formed by the epidermis. In many reptiles and in some lizards the two layers of the skin similarly participate in forming the exoskeleton. The scales of fishes are formed by the dermis or true skin; but those of serpents are epidermic in their nature.

Skin Diseases, a name for such diseases as eczema, shingles, ringworm, pityriasis, lichen, itch, etc.

Skin-grafting, in surgery, a method for the treatment of large ulcerated surfaces by the transplantation of small pieces of skin from another part of the body. It has recently been learned that skin kept in cold storage can be successfully applied for this purpose, thus enabling skin taken from amputated limbs, etc., to be thus kept and used. A late experiment with the membrane of eggs, instead of skin, is said to have proved a complete success.

Skink, the common name of small lizards belonging to the genus *Scincus*. They have a long body entirely covered with rounded imbricate scales, and are natives of warm climates.

Adda or Common Skink (*Scincus officinālis*).

One species, the adda (*Scincus officinālis*) is celebrated throughout the East as being efficacious in the cure of various cutaneous diseases, to which the inhabitants of Egypt, Arabia, etc., are subject. It is about 6 inches in length, has a cylindrical body and tail, and burrows in the sand.

Skinner (skin'er), Charles Montgomery, author, born at Victor, New York, in 1852. He wrote *Myths and Legends of Our Own Land*, *With Feet to the Earth*, *Do-Nothing Days*, etc. Also the drama *Villon, the Vagabond*, played by his brother, Otis Skinner. He died in 1907.

Skio. See *Scio*.

Skipton (skip'tun), a town in England, county of York (West Riding), near the river Aire, 26 miles N. W. of Leeds. It has manufactures of cotton and woolen goods, and an ancient castle, a spacious quadrangular structure, the greater part of which was erected in the reign of Edward II. Pop. 12,981.

Skirmishers (skir'mish-ėrz), troops serving in loose order in front of an army. Their usual employment is to protect an advancing army from a surprise.

Skirret (skir'et; *Sium Sisarum*), a plant belonging to the nat. order Umbelliferæ, sometimes cultivated in kitchen-gardens for its roots. It is a perennial plant, a native of China and Japan. The roots are composed of several prongs about the thickness of a finger, joined together at the top. The flowers are white, and the roots, which resemble parsnip, may be used from the end of September onwards.

Skittles (skit'lz), a favorite game in England, generally played in covered grounds called skittle-alleys. It is played with a flattish-shaped wooden ball about a foot in diameter, and nine skittles or wooden pins, cigar-shaped and about a foot high. The players try each in turn with how few casts of the ball they can knock down all the skittles. There are, however, minor variations in playing the game. It is also known as ninepins, and in the United States as tenpins, ten instead of nine pins being used, while the balls used are round and of several sizes.

Skobeleff (skō'be-lef), Mikhail Dimitrievich, a Russian general, born in 1843, and entered the army as sublieutenant in 1861. He distinguished himself against the Poles in 1866, and afterwards in Central Asia. In 1876 he was appointed military governor of the province of Ferghana. In the Russo-Turkish war Skobeleff dis-

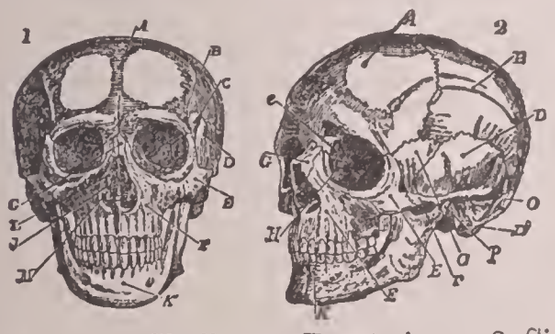
tinguished himself at the second battle of Plevna, and also at Loftscha. In 1878 he was created adjutant-general to the emperor. In 1880 he successfully led an expedition against the Tekke Turcomans, and captured Geok Tepe, Jan. 12, 1881. He was then promoted to the rank of general. He died suddenly in Moscow in 1882. He was a brilliant and scientific officer, and much beloved by the troops.

Skopelos (sko′pe-lōs; anc. *Peparēthos*), an island, one of the Northern Sporades, Grecian Archipelago, about 11 miles long and 5 miles broad. The town of Skopelos, on its southeast shore, is a Greek see, and has a number of churches and convents. Pop. about 6000.

Skowhegan (skou-hē′gan), a city, county seat of Somerset Co., Maine, on Kennebec River, 30 miles N. by E. of Augusta. It has good water power, and has paper and pulp mills, oilcloth, leather, woolens, tools, and other factories. Pop. 5981.

Skua-gull (skū′a), a powerful bird of the gull family, the *Stercorarius* or *Lestris cataractes*. It is found in the Shetland Islands, the Faroe Islands and Iceland, and displays much courage in making other birds which prey on fish disgorge their newly-caught food. Smaller species are known in Britain as the Arctic skua and long-tailed skua.

Skull, the name applied to the skeleton of the head, composed in most vertebrates of a *facial* and a *cranial* portion, and which incloses the



The Human Skull.— 1, Front view. 2, Side view.

brain and organs of special sense. The skull of man includes twenty-two bones. In the *cranial* portion there are eight bones, the *occipital* bone O, or hinder portion of the skull; two *parietal* bones B, forming the sides of the head; two *temporal* bones D D′; the *frontal* bone A; the *sphenoid* bone C, mainly in the base of the skull; and the *ethmoid* bone *e*, between the skull and the face, and between the eye cavities. The *facial* portion includes fourteen bones — two *nasal* bones G; two *superior maxillary*, or upper jaw-bones F; two *lachrymal* bones H; two *malar* or cheek bones E; two *palate* bones; two *turbinated* bones L M; the *vomer*, dividing into two the cavity of the nose J, and the *inferior maxillary* or lower jaw-bone K. This is the only bone which is movable, a hinge-joint being formed between its strong prominences at *p*. The left *zygomatic* arch is shown at *r*. At the base of the occipital bone is the large aperture termed the *forāmen magnum*, through which the brain and spinal marrow, become continuous. The two lesser *foramina*, one in either orbit, transmit the optic nerves. The size and shape of the skull vary in the different races of man, and at different ages from infancy to old age. The skulls of most vertebrata differ widely from that of man in the relative development of their various parts. See also special articles, such as *Ichthyology*, *Ornithology*, *Reptilia*, etc., and also *Ear*, *Eye*, *Nose*, etc.

Skunk (*Mephītis mephitica* or *putorius*), a carnivorous animal belonging to the weasel family. It inhabits

Common Skunk (*Mephītis mephitica*).

North America, and its average size is about that of a large cat. Its fur is of a dark-brown hue, streaked longitudinally with black and white, and its tail is long and bushy. The skunk is notorious from the potent and disgusting odor which it emits from its anal glands, and which is perceptible a mile away. The secretion of these glands can be forcibly ejected at the will of the animal, and its stench is so persistent that no amount of washing will remove it from clothes impregnated with it. This nauseous secretion has been alleged to possess therapeutical virtues. The skunk is largely hunted for the sake of its fur, which is purified for commercial purposes by heat. There are two other less common species, now classed in separate genera.

Skunk-cabbage (*Symplocarpus fœtidus*), a plant of the nat. order Araceæ or arums, so named from its smell. The root and seeds are said to be antispasmodic, and have been used as expectorants and as palliatives in asthma. It is common in the northern United States and Canada, where it is one of the earliest spring plants to appear.

Skye (skī), the largest of the Hebrides or Western Isles of Scotland, situated on the west of the county of Inverness, of which it forms a part, and from which it is separated by Kyle Rhea and the Sound of Sleat; greatest length, 48 miles; breadth, from 3 to 25 miles; area, about 535 square miles. It is everywhere deeply indented by sea-lochs, and is noted for the grand cliff and mountain scenery around its coasts. The interior may be regarded as one great mountainous moorland, rising in Cuchullin Hills to an altitude of 3200 feet. Numerous streams and fresh-water lochs afford abundance of trout and salmon. The climate is moist and variable. The only arable land lies along the sea-board, and is mostly cultivated under the crofter system. The greater part of the surface is devoted to the rearing of sheep and cattle. The only mineral profitably worked is a crystalline limestone, which furnishes blocks of white and variegated marble. Fishing is the employment of a large number of the population. Portree, a seaport on the east coast of the island, has an excellent harbor. The Gaelic language is mostly spoken. Pop. 14,642.

Skye Terrier, a breed of dogs supposed to be the outcome of a cross between the native dog of Skye and a Maltese terrier.

Skylark. See *Lark.*

Sky-rocket, a firework composed of a mixture of niter, sulphur and charcoal tightly rammed in a stout paper case, which ascends when the compound is ignited at the lower end. A stick is attached to one side of the case to steady the flight.

Skyros (skī'rōs), or Skyro, an island in the Grecian Archipelago, about 25 miles east of the island of Eubœa; greatest length, N. N. W. to S. S. E., about 18 miles; breadth, 7 miles. It belongs to the nomarchy of Eubœa, and is rocky and not very fertile, but exports corn and fruits. Pop. about 3500.

Sky-scraper, the name often given to the very tall office buildings now numerous in all the large American cities. They are strong structures, with riveted steel frames, resting on bed-rock or great cantilevers sunk far below the surface.

Slag, a secondary product of the processes of extracting metals from their ores. It is mainly a compound of silica with alumina or lime, or both, together with various other substances in small quantity. It always contains more or less of the metal from the extraction of which it results. The presence of silica gives a glassy appearance to the mass. Slag is sometimes cast into blocks, and used for road-making and building, and when reduced to powder it is used in making mortar, and in some parts of Europe to impart a glaze to bricks. It is also utilized in the manufacture of glass. *Slag phosphate meal* is a fertilizer made from basic slag (which see).

Slander. See *Libel.*

Slate (slāt), or Clay-slate, called sometimes *argillite*, a well-known hard variety of rock which splits into thin plates, the type being roofing slate. The lamination of slate is not that of its bedding, but is often at right angles to it. It is produced by lateral pressure, and is confined to disturbed and metamorphosed rock. The prevailing color is gray, of various shades; it yields to the knife, but varies considerably as respects hardness in its different varieties. Slate occurs in all countries where there are metamorphic rocks. It is commonly divided into elevated beds of various degrees of thickness; and from the natural divisions of the rock they often form peaked and serrated mountains. The finest variety which is used for the covering of roofs is generally embedded in other slate rocks of a coarser kind. Quarries of slate of this description are worked extensively in various localities in the United States and England. Those slates which contain a large proportion of quartz are called *whet-slate.* The most valuable kinds come from Sonnenberg in Meiningen, and Saalfeld. *Chlorite* or *talc slate* are those kinds which contain a large percentage of talc. *Drawing slate*, or *black chalk*, is slate containing 8 to 10 per cent. of carbonaceous matter. It comes from Italy, Spain, and Bayreuth. *Polishing slate*, which is composed of the skeletons of infusoria, occurs at Planitz near Zwickau, and near Bilin in Bohemia. It is used for polishing metals. *Slate-pencils* are made of certain varieties of soft slate.

Slater (slā'tėr), the popular name of the Oniscidæ or wood lice fam-

ily of crustacea, belonging to the order Isopoda. The common wood-louse or slater (*Oniscus* or *Porcellio scaber*) is usually found beneath stones, among damp moss, and in similar situations. The color is a dull leaden hue, which sometimes exhibits white spots. The land slater (*Oniscus asellus*), is another familiar species, and is spotted yellow and white. The water-slaters, genus *Asellus*, are found in fresh-water streams and ponds.

Slave Coast, a maritime strip on the west of Africa, on the Guinea Coast, extending between the Volta and Akinga, a stretch of about 240 miles. It consists mainly of long narrow islands. The principal towns on the coast are Badagry and Whydah. A large traffic in slaves was formerly carried on at the ports of this region, hence its name. The Slave Coast is divided into sections which belong to Germany, France and Great Britain.

Slave Lake, Great, a large lake in Northwestern Canada, between Hudson's Bay and the west coast. It is of extremely irregular form, and has an estimated area of 12,000 square miles. It receives the waters of Lake Athabasca by the Slave River on the south, and discharges its own waters by the Mackenzie at its western extremity. The banks of Slave River are in many parts well wooded; numerous rapids and falls occur in its course.— Lesser Slave Lake lies about 270 miles southwest of Lake Athabasca, in the district of Athabasca. It is about 60 miles long, and its greatest breadth about 12 miles.

Slave River. See *Slave Lake, Great.*

Slavery, the system by which certain persons are kept as the property of others, a system of great antiquity and formerly of wide prevalence. Among the Hebrews the system of slavery was one of great mildness. Native Hebrew slaves were released every seventh year, and their owners were enjoined to treat them kindly. Among the Greeks and Romans slavery was a rooted institution. At Athens the slaves were commonly treated with mildness, but at Sparta they are said to have been dealt with very harshly. The slaves of the ancient Romans were either captives or debtors that were unable to pay. In Rome the slave had originally no rights at all. He could be put to death for the smallest misdemeanor. Slaves were exceedingly numerous, and in time almost monopolized all the various handicrafts and occupations, those of the clerk, the doctor and the literary man included. In the time of Augustus a single person is said to have left at his death over 4000 slaves. Hosts of slaves were employed in the gladiatorial exhibitions. Slave revolts occurred in 134 and 102 B.C. in Sicily, and a revolt in Italy led by the gladiator Spartacus, in 73 B.C. was put down only with considerable difficulty. Slaves, however, were often set at liberty, and these freedmen were a well-known class at Rome. But it was not till the time of the empire that any great change took place in the condition of the slaves. Augustus granted the slave a legal status, and Antoninus took away from the masters the power of life and death over their slaves. The early Christian church did much to diminish slavery, but slavery and the slave trade continued to exist for 1000 years in the Christian nations of Europe that rose on the ruins of the Roman Empire. It was not till the thirteenth century that the scourge of slavery began to die out in Europe. The Koran expressly permits the Moslems to acquire slaves by conquest, but this method of acquiring slaves was not resorted to until the Crusades. Previous to the Crusades they kept negro slaves imported from Africa. Subsequently the Mohammedans began to obtain white slaves not only by war but also by purchase, even from parts of Western Europe. The Mohammedans of the Barbary States also obtained white slaves by piracy in the Mediterranean.

After slavery had become all but extinct in Europe, it had a new birth in the American colonies of European origin. The Portuguese were the first to hunt negroes in the interior of Africa for use as slaves in the colonies. The first shipment of negroes to the New World took place in 1503, when the Portuguese landed some in St. Domingo. From that time to the present century a traffic in negroes across the Atlantic was carried on by all the Christian colonial powers. In 1562 the English first took part in the trade, and in course of time outdid all other nations in the extent to which they carried this traffic, as also, it is said, in the cruelty with which they conducted it. About 1770 nearly 200 English vessels were engaged in the trade.

The first persons who liberated their slaves, and labored to effect the abolition of the slave trade, were some Quakers in England and the United States early in the eighteenth century. In 1783 a petition was addressed to the British parliament for the abolition of the trade, which Wilberforce supported. But the soul of all the efforts for the abo-

lition of the traffic was Thomas Clarkson. In 1788 Pitt presented a petition against the trade to the House of Commons, but the merchants of Liverpool and Bristol resisted its abolition so violently that Pitt, Fox, Wilberforce, and others could effect nothing but the passage of some provisions for diminishing the hardship of confinement on shipboard.

A bill passed the House of Commons for the abolition of the slave trade in 1792, but it was rejected by the Lords. On February 4, 1794, the French National Convention declared all the slaves of the French colonies free. Wilberforce brought in a bill with a like object in 1796, but it was rejected. The African Society, founded by Wilberforce and Clarkson, now redoubled its efforts to procure the suppression of this traffic, and in March, 1807, the famous Abolition Act was passed. January 1, 1808, was fixed as the time when this trade, on the part of the British, should cease. The same date was fixed in the Constitution of the United States for the suppression of the slave trade. The abolition of the slave trade by most of the European powers was gradually provided for by treaty. The abolition of slavery itself gradually followed that of the trade in slaves. In the United States all the Northern States in which slaves were held passed laws for the immediate or gradual emancipation of the slaves at various dates between 1777 and 1804. In 1831 the British government emancipated all the slaves of the crown, and in 1833 a bill was passed for the emancipation of all the slaves in British colonies. By this bill the slaves were to receive their freedom on August 1, 1834, and a compensation of £20,000,000 was to be distributed as a gift among the slave holders, to compensate them for any loss they might sustain by the arrangement. The greatest slave-holding nation within recent times was the United States, in which, however, slavery had become confined to the Southern States. As a result of the Civil war it was abolished by proclamation in 1863, and by constitutional amendment in 1865. In 1873 the Spanish government abolished slavery in Porto Rico, and in 1886 abolition in Cuba took place. In Brazil slavery existed till 1888. A decree for its abolition in China was announced in 1910.

The efforts which were constantly being made to suppress the slave trade on the east coast of Africa only slowly led to satisfactory success. In 1817 a treaty for its suppression was concluded with Madagascar, and in 1822 with the Imam of Muscat (ruler of Oman); but the slave trade continued as active as ever along the whole coast. Those chiefly engaged in the trade were Arabs, who sold the slaves in the African countries bordering on the Mediterranean and at the ports of the Red Sea. They were all ultimately destined for Mohammedan masters. The suppression of the trade was one of the objects of Sir Samuel Baker's expedition up the Nile in 1870-73; and much more vigorous and effective measures were carried out by General Gordon in 1877 and subsequent years. In May, 1873, a treaty was signed stipulating for its suppression within the dominions of the Sultan of Zanzibar; and the slave-market at Zanzibar was thereupon closed. Even as late as 1894, though Britain and Germany were unceasing in their efforts to put down the traffic in the interior of the country, it still continued alive. It was carried on chiefly by so-called Arabs, and the cruelties perpetrated by and under the direction of these ruffians in their raids for slaves were appalling. Since then, however, the control of most of the coast by European nations has fairly put an end to this deplorable traffic.

Slavonia (sla-vō'ni-a; German, *Slavonien*), a district of the Serb-Croat-Slovene state of Jugo-Slavia; formerly a crownland of Hungary, forming with Croatia an autonomous province within Austria-Hungary. A branch of the Carnian Alps traverses it, and forms the watershed between the Drave and the Save, tributaries of the Danube. Along the rivers extend fertile plains, where large crops of wheat and corn are raised, and immense herds of cattle and swine are reared. Flax, hemp, fruit (peaches, chestnuts, almonds, figs), tobacco and wine are produced. Manufactures are not extensive. The inhabitants are mostly of the same race with the Servians; and on the defeat of Austria, in 1918, at the end of the European war (q. v.) they joined with the Servians and Croats and established the Serb-Croat-Slovene state known as Jugo-Slavia (q. v.). Pop. 378,000.

Slavs (slavs), a branch of the Aryan family of nations, among which it is most nearly allied to the Lithuanian and more distantly to the Germanic branch. In the fourth century Slavs lived in great numbers in the neighborhood of the Carpathians, and thence they appear to have spread northward to the Baltic and southward to the Adriatic. About the beginning of the sixth century they are found on the northern banks of the Lower Danube, whence they passed

over to the southern banks, occupying Mœsia and Thrace; at this time Slavs also peopled Bohemia and Moravia, and before the end of the century they had penetrated into Transylvania, Hungary, Upper Austria, Styria, Carinthia, and Carniola. The Slavonic tribes of Chorvatians (Croats) and Servians settled probably between 634 and 638 in Dalmatia and the whole of ancient Illyricum (what is now the Serb-Croat-Slovene state of Jugo-Slavia). Finally, Slavonic tribes spread from their first settlements also to the north and east, over the remainder of modern Russia. Of this wide territory the Slavonians again lost in process of time the Elbe and Oder regions, Upper Austria, and part of Carinthia and Styria, of all of which they were deprived by Germanic tribes; large parts of Transylvania and Hungary, which fell to Roumanians and Magyars; and parts of the regions on the south of the Danube, which fell to Greeks and Turks.

The Slavs form three groups: (1) *the Eastern group*, Great Russians, Little or Malo Russians (including Ruthenians and Ukrainians), and White Russians; (2) *the Western group*, Poles, Czechs (comprehending Czechs in the narrower application, Moravians, and Slovaks), and Sorbs, or Wends (Lusatians), divided into Upper and Lower Sorbs; (3) *the Southern group*, Slovenians, Serb-Croats, and Bulgarians. The total number of Slavs is said to be about 160,000,000. They adhere to the Greek Orthodox or the Roman Catholic Church.

The peace of 1919 (see *Treaty*), following the European war, 1914-18, resulted in new boundary lines for the countries inhabited by the Slavic peoples, the Serbs, Croats and Slovenes being united in the new state of Jugo-Slavia; the Czechs and Slovaks joining to create the state of Czechoslovakia; and the Poles winning independence and the reconstruction of the state of Poland. (See the articles under these headings.)

Sledge (sledj), a vehicle moved on runners or on low wheels, or without wheels, for the conveyance of loads over frozen snow or ice, or over the bare ground; called also a *sled*. Also a kind of traveling carriage mounted on runners, otherwise called a sleigh; much used in Russia, Canada, and other northern countries during winter, instead of wheel-carriages, also in the United States for pleasure purposes.

Sleep (slēp), the state in which the activity of the senses and cerebrum or brain proper appears to be naturally and temporarily suspended. This state is consistent with a kind of passive activity of these nervous centers, as seen in the acts or phenomena of dreaming, as well as in other concomitant phenomena of sleep. All parts of the body which are the seat of active change require periods of rest. In the case of the brain it would be impossible that there should be short periods of activity and repose, that is, of consciousness and unconsciousness, hence the necessity of sleep, a condition which is an unusually perfect example of what occurs at varying intervals in every actively working portion of our bodies. Sleep, therefore, affords the interval during which nervous energy expended during the waking hours is renewed. The respective influences of habit, age, temperament, and occupation have much to do with the induction and maintenance of sleep in different individuals. An abnormal condition of irritability caused by great mental effort or strain for a considerable time, frequently results in preventing the access of sleep when it is desired. This indicates a revolt of the nervous centers, which may prove dangerous if the cause of it be not speedily done away with. Sleep often occurs in very different degrees in different parts of the nervous system. The phenomena of *dreams* and *somnambulism* are examples of differing degrees of sleep in different parts of the cerebrospinal nervous system. Physiologists are all agreed that the dreamless sleep is the most refreshing, the lighter sleeper being liable to be disturbed by the most trifling noises. In some cases of diseased conditions sleep may be prolonged for indefinite periods, although obviously the distinction between coma and sleep is only made with great difficulty in such cases; while, on the contrary, periods of active wakefulness may occur and extend for days, weeks, or even months, without a single interval of sleep or repose. Insensibility is generally produced by a deficient and an excessive quantity of blood within the cranium; but it was once supposed that the latter offered the truest analogy to the normal condition of the brain in sleep, and, in the absence of any proof to the contrary, the brain was said to be during sleep *congested*. Direct experimental inquiry has led, however, to the opposite conclusion. The condition of the brain during sleep is one of considerable bloodlessness. There seems to be both a diminished quantity of blood circulation through the brain, and the speed of its movement is much lessened. See *Dreams*, *Somnambulism*.

Sleeping Sickness, a deadly African disease, transmitted by the bite of the tsetse fly, which introduces tripanosomata into the human system. It produces a lethargy which is almost certain to end in death. It made its way within recent years from Central Africa to Uganda, where the mortality became very great, ranging from 20,000 to 30,000 a year. It has been found that the fly is confined to certain fixed localities, one being in the strip of timber along the shore of the Victoria Nyanza. By removing the inhabitants from these districts the mortality was reduced in 1908 to less than 2000, and these probably persons infected before removal. No cure for the disease has yet been found, though vigorous efforts are being made to discover some means of combating it.

Slesvig. See *Schleswig-Holstein.*

Slibovitz (slib'o-vitz), a kind of spirit distilled in Austria-Hungary from the fermented juice of plums.

Slidell (slī'del), JOHN, statesman, born at New York about 1793, practiced law in New Orleans after 1819. He was made U. S. district attorney for Louisiana in 1834; elected to Congress in 1843; was minister to Mexico 1845; United States Senator 1853-61. He joined the Confederate cause in 1861 and was sent in November, with James M. Mason, as a commissioner to France. The commissioners were seized on the English mail-steamer *Trent* by Captain Wilkes, of the *United States.* This seizure threatened to lead to war with England. He was released in January, 1862, and went to France, but failed in the principal object of his mission, that of obtaining recognition of the Confederacy. He died in 1871.

Slide-rest, an appendage to the turning-lathe for holding and resting the cutting-tool, and ensuring accuracy in its motion. The slide-rest imparts motion to the cutting-tool in two directions, the one being parallel and the other at right angles to the axis of the lathe.

Slide-valve, a contrivance extensively employed in regulating the admission or escape of steam or water in machinery. A familiar example of the slide-valve is found in the ordinary steam-valve of a steam-engine.

Sliding-rule, a mathematical instrument or scale, consisting of two parts, one of which slides along the other, and each having certain sets of numbers engraved on it, so arranged that when a given number on the one scale is brought to coincide with a given number on the other, the product or some other function of the two numbers is obtained by inspection. The numbers may be adapted to answer various purposes, but the instrument is chiefly used in gauging and for the measuring of timber.

Slieven (slē'ven), a town of Eastern Roumelia, at the foot of the Balkans, with manufactures of cloth, otto of roses, etc. Pop. 20,893.

Sligo (slī'gō), a seaport town of Connaught province, Ireland, capital of county Sligo, 134 miles N. W. of Dublin, near the mouth of the Garvogue (which drains Lough Gill) in Sligo Bay. It is the most important seaport in the N. W. of Ireland, and has a large trade, chiefly with Liverpool, Glasgow, Londonderry, and a few foreign ports. The exports consist chiefly of provisions, cattle, grain, flour, etc.; and the imports, colonial produce, timber and coals. Pop. 10,870.—The county has an area of 707 sq. miles, and is more pastoral than agricultural in its industries. The surface is partly level and partly mountainous, the Ox mountains rising to nearly 1800 feet high. There are several lakes, including the beautiful Lough Gill, Lough Arrow and Lough Gara. The principal crops are oats and potatoes. Coarse woolens and linens are manufactured for home use. The coast fisheries are extensive. Sligo is the only town of any size. The population has decreased from 189,900 in 1841 to about 84,083 at the present time.

Sling, an instrument for throwing stones or bullets, consisting of a strap and two strings attached to it. The stone or bullet is lodged in the strap, and the ends of the strings being held in the hand the sling is whirled rapidly round in a circle, and the missile thrown by letting go one of the strings. The velocity with which the projectile is discharged is the same as that with which it is whirled round in a circle, having the string for its radius. The sling was a very general instrument of war among the ancients. With a sling and a stone David killed Goliath. The name is also given to a kind of hanging bandage in which a wounded limb is sustained; and to a device for holding heavy articles, as casks, bales, etc., securely while being raised or lowered.

Slip, an inclined plane upon which a vessel is supported while building,

or upon which she is hauled up for repair; also, a contrivance for hauling vessels out of the water for repairs, etc. One form of slip consists of a carriage or cradle with truck-wheels which run upon rails on an inclined plane. The ship is placed on the carriage while in the water, and the carriage together with the ship is drawn up the inclined plane by means of wheels and pinions wrought by men or steam power.

Slips, PROPAGATION BY, a mode of propagating plants, which consists in separating a young branch from the parent stock, and planting it in the ground. Slips from trees of which the wood is white and light, such as willow, poplar, or lime, succeed best. A slip succeeds more certainly when two or three young buds are left on the lower part of it under ground.

Sliven. See *Slieven.*

Sloane (slōn), SIR HANS, a distinguished naturalist, and founder of the British Museum, was born in the north of Ireland in 1660; studied medicine in London, Paris, and Montpellier, and died at Chelsea in 1753. In 1684 he settled in London in the practice of his profession, and in 1685 was admitted a fellow of the Royal Society, of which he was appointed secretary in 1693, and president in 1727. His *Natural History of Jamaica* (1707-25) was the result of his observations in that island during a visit in 1687-89. George I created him a baronet and physician-general to the forces in 1716, and on the accession of George II he was named physician in ordinary to his majesty. See *British Museum.*

Slobodskoi (slå-bât-skoi'), a town of Russia, government of Viatka, on the right bank of the river Viatka. Pop. 10,052.

Slocum (slō'kum), HENRY WARNER, soldier, born at Delphi, New York, in 1827. He was graduated from West Point Academy in 1852, resigned from the army in 1856, but entered the service as colonel of volunteers in 1861. He was appointed brigadier-general in the autumn of 1861, fought in the battles before Richmond, was made major-general in July, 1862, and commanded a corps at Chancellorsville and Gettysburg. He was made a corps commander under Sherman in 1864 and led one of the wings of Sherman's army in its great march through Georgia. He died April 14, 1894.

Sloe (slō), or BLACKTHORN (*Prunus spinosa*), a well-known deciduous shrub of the plum genus, with spinose branches, and possessing a very hard, tough wood. It blossoms with white flowers in the early spring, and has a black, round, austere fruit which is used for preserves, for making a fictitious port wine, and for dyeing black. The sloe abounds in most parts of Europe, and is from 8 to 15 feet high. There are two or three varieties, including double-flowered, variegated-leaved, and egg-shaped fruited forms.

Flower and Fruit of Sloe (*Prunus spinosa*).

Slonim (slo'nyem), a town in the government of Grodno, Russia, and 70 miles southeast of the town of Grodno. Pop. 15,893.

Sloop (slöp), a small vessel furnished with one mast and a fixed bowsprit. It is fore-and-aft rigged, and usually carries a main-sail, fore-sail (jib-shaped), a jib, and a gaff-sail. It is a common rig for yachts. A *sloop-of-war* in the older American navy, was a vessel below the size of a corvette, and above that of a brig. Sloops of war carried from ten to eighteen guns.

Sloth (slōth), the name applied to several genera of edentate mammalia inhabiting South and Central America and forming the family Bradypodidæ. This family is distinguished by the flat short head, and by the elongated legs, furnished with powerful claws of compressed and curved shape. No incisor teeth exist, but simple molars are developed. The stomach is of somewhat complex nature. The fore-limbs are longer than the hind-limbs, and have a powerful muscular organization. The palms and soles of the feet are turned inwards, and the claws are bent inwards towards the soles, so that the sloth's movements on the ground are both awkward and painful; but in their natural habitat amid the trees, the curved and inwardly-disposed claws and limbs are seen to be admirably adapted for locomotion in their characteristic fashion, back downwards, through their native forests. Of the sloths the best-known species is the ai (*Bradypus tridactylus*), which has three toes and is of a brownish-gray color, with darker tints on the face and limbs. The fur is of very coarse character. The unau, or two-toed sloth (*Cholœpus didactylus*), has an average length of about 2 feet, and its color is a lighter gray

than that of the ai. The tail in both species is either wanting, or at the most is of rudimentary character.

Sloth Bear. See *Aswail.*

Slot Machine, an apparatus in which a coin of fixed denomination and weight, dropped through a slot, by its weight sets the internal machinery in operation to the production of a certain effect, such as passing out candy or other material to the operator. These machines have been adapted to the sale of postage stamps, to the setting free of a fixed quantity of illuminating gas, and to numerous other purposes, some of them of a gambling character.

Slough (slou), a town of England, in Buckinghamshire, 20 miles west of London and 2 northwest of Windsor. At Slough Sir William Herschel erected his large astronomical telescope, and made some of his most important discoveries. Pop. 14,985.

Slovaks (slō′vakz), the name of the Slavonian inhabitants of Northern Hungary, also found in Moravia in the districts adjoining Hungary, and in detached settlements in Lower Austria, Bukowina and Slavonia. The Slovaks possess in their own dialect a number of beautiful popular songs, collections of which have been published at different times. The total number of Slovaks is under 2,000,000.

Slovenians (slō-vē′ni-anz), the native name of some Slavonian tribes in Styria, Carinthia, Carniola and Hungary, numbering about 1½ million. The language of the Slovenians is closely allied to the Servian. It possesses some very old and valuable literary monuments.

Slow-match, a match made so as to burn very slowly. The commonest kind of slow-match is a piece of slightly twisted hemp rope dipped in a solution of saltpeter, sugar of lead, etc. Slow-matches are chiefly used to fire mines or blasts, the object of using them being to allow the person who fires them to escape to a safe distance before the explosion takes place.

Slow-worm. See *Blind-worm.*

Sloyd, SLÖJD (sloid; a Scandinavian word equivalent to the English *sleight*), a system of manual training for pupils in elementary and higher schools, much in vogue on the Continent and practiced in some English educational establishments, in which the pupils are accustomed to the use of tools in a handicraft, which is not necessarily intended to form their future exclusive or main occupation. It is applied to any useful handiwork such as carpentry, metal-work, basket-work, fretwork, bookbinding, etc., but is usually confined to *wood-sloyd*, or the use of the knife and carpenter's tools. There is a training school for Sloyd near Gothenburg, which is attended by teachers from all countries. It is already practically introduced into America under the name of manual training.

Slug, the name applied to several genera of gasteropodous molluscs, included in the pulmoniferous (or 'lung-bearing') section of the class, and resembling the snails, but not having an external shell. The typical slugs form the family Limacidæ, and possess a rudimentary shell, internal in its nature, and generally concealed more or less completely by the mantle. The body is elongated, depressed, and attenuated backward, the head and tentacles retractile. The latter are four in number, the eyes being borne on the tips of the larger pair. Of this genus the great gray slug (*Limax antiquorum*), the largest British species, and the black slug (*L. afer*) are the two familiar species. The former usually frequents hollow trees, undisturbed heaps of decaying vegetable matter, and like situations. The black slug is more common than the gray species, and is usually of smaller size. Other familiar genera are the *Arion*, represented by the red slug; and the *Testacella*, represented by the little carnivorous *Testacella haliotoides*, which feeds chiefly upon earthworms, and is generally found in the loose soil of gardens.

Slur, in music, a sign in the form of a curve, placed over two or more notes on different degrees, to indicate that they are to be played *legato.*

Smack, a small decked or half-decked vessel rigged as a cutter, sloop, or yawl, used in the coasting trade and in fishing.

Smalkaldic League. See *Schmalkalden (League of).*

Small-arms, a general name for all portable fire-arms. (See *Musket, Rifle, Revolver*, etc.). The name of *small-arms factories* is given to certain government establishments for the manufacture of small-arms.

Smalley (smą̄l′li), GEORGE WASHBURN, journalist, born at Franklin, Massachusetts, in 1833. He served as war correspondent of the *New York Tribune* during the Civil war, the German-Austrian and the Franco-German wars, was London correspondent of the *Tribune* 1867-95, and became American correspondent of the London *Times* in

1895. He gained an eminent position in journalism. Author of *Anglo-American Memories.* Died in 1916.

Smallpox, an acute infectious disease, characterized by a typical eruption accompanied by high fever. The first symptoms of the disease appear about seven days after infection, when a feverish shivering pervades the body, followed about three days later by the appearance of red spots on the face, breast, hands, and gradually over the whole body. After about three days these spots develop pustules, which become inflamed and suppurate. About the eleventh day the pustules begin to dry up and form a crust. Commonly the smallpox virus infects but once, and then only those persons who have a certain susceptibility for it. The disease is first mentioned by Arabic writers. It is not certain how it was introduced into Europe, but from the thirteenth century downwards it raged with great destructiveness among the Western nations. It spread to America with the Spaniards and ravaged the country. As a means of dealing with the disease, inoculation was introduced to England by Lady Montagu in 1718; but this has been superseded by vaccination (q. v). Smallpox is very contagious, but neither the exciting cause of the disease nor the exact method of its transmission is known. The only method of controlling the disease is by compulsory vaccination, which renders the person immune for a variable period of years and should be repeated every eight or ten years. One attack of the disease generally protects the person against a subsequent attack; but this is not invariably the case.

Smalt (smąlt), a combination of common glass with the protoxide of cobalt which imparts a deep blue tinge to the glass. When reduced to an impalpable powder it is employed in painting and printing upon earthernware, and to give a blue tint to writing-paper, linen, etc. It was discovered by a Bohemian glass-blower in the sixteenth century.

Smart (smärt), CHRISTOPHER, an English poet, born in 1722, and educated at Pembroke College, Cambridge, where he obtained a fellowship in 1745. He was improvident and of a convivial disposition. He died within the rules of the King's Bench prison for debtors in 1771. His most remarkable production was the *Song to David* (1763), written on the walls of a lunatic asylum, where he was temporarily confined. He translated into Latin Pope's *Ode on St. Cecilia's Day* and *Essay on Criticism,* the *Works of Horace* into English prose and verse (1765 and 1767), and published the *Parables of Christ* done into verse (1765).

Smart, SIR GEORGE, musician, son of a music-seller in London, born in 1776; died in 1867. By industry and careful study he rose to be composer and organist to the Chapel-Royal, St. James's, and directed the music at the coronation of William IV and Queen Victoria. He was knighted in 1811. He conducted the principal musical festivals, and was the first to introduce Mendelssohn's oratorio *St. Paul* and Rossini's *Stabat Mater.* Among his pupils were Madame Sontag and Jenny Lind.

Smeaton (smē'tun), JOHN, civil engineer, son of an attorney, was born in 1724 at Austhorpe, near Leeds, England. He at first followed his father's profession, but abandoned it for engineering. In 1751 he invented a machine for measuring a ship's way at sea, and also a new form of compass. In 1753 he was elected a fellow of the Royal Society, and was awarded the Copley medal in 1759. In 1755 he was intrusted with the rebuilding of the Eddystone lighthouse, which was completed in October, 1759. It stood till 1882, when it was replaced by a new structure. Smeaton was subsequently employed on many works of great public utility, including the Forth and Clyde Canal and Ramsgate harbor. He also perfected Newcomen's engine. (See *Steam-engine.*) He died in 1792.

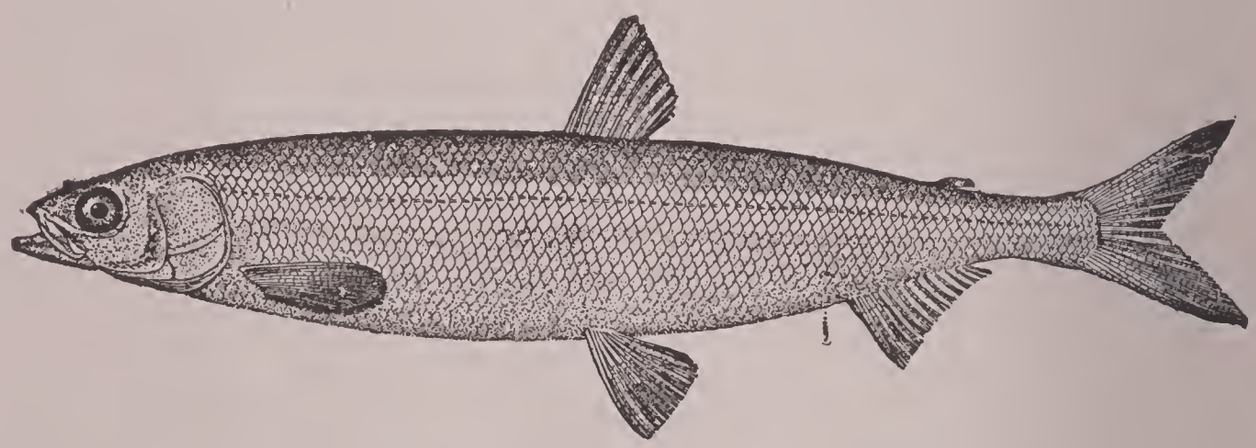
Smedley (smed'li), FRANCIS EDWARD, novelist, son of Francis Smedley, high-bailiff of Westminster, born at Marlow, England, in 1819; died at London in 1864. He was a hopeless cripple from his infancy, and was unable to take active exercise of any kind. He was the author of *Frank Fairleigh* (1850), *Lewis Arundel* (1852), *Harry Coverdale's Courtship* (1854), etc.

Smell, the sense exercised in the perception of odors, through the functions of the olfactory nerves. The sense is one of the special senses in that the nerves devoted to the appreciation of odors exercise that function alone, and are not affected by any other kind of impressions; while again, no nerves are capable of receiving the particular impressions of odors but the olfactory filaments. The sense of smell is derived exclusively through those parts of the nasal cavities in which the olfactory nerves are distributed. (See *Nose.*) The matters of odor must in all cases be dissolved in the mucus of the mucous membrane before they can be immediately applied to or affect the olfactory nerves; thus for the perception of odors the

mucous membrane of the nasal cavity must be moist. In animals living in the air it is also requisite that the odorous matter should be transmitted in a current through the nostrils. This is effected by an inspiratory movement, the mouth being closed. The *voluntary* nature of the act of smelling is also thus exemplified, since by interrupting the respiration or breathing, the sense cannot be duly exercised. The delicacy of the sense of smell is most remarkable; it can discern the presence of bodies so minute as to be undiscoverable even by spectrum analysis; three one-hundred-thousandth of a grain of musk can be smelt. The olfactory nerves form the *first pair* of cranial nerves, or those given off directly from the brain as a center. The facility with which different odors are smelled varies in different animals. Thus carnivorous mammalia are more susceptible to the odors of other animals than herbivorous forms; and the latter in their turn are more readily affected by the smell of plants. Although the sense of smell in man is less acute than that of many animals, yet his sphere of susceptibility to various odors is more uniform and extended. The influence of *habit* is very marked in the exercise of this sense, custom enabling the individual to inhale odors which at first might be distasteful or nauseous to him. Certain diseases of the brain may produce anomalous effects on the olfactory sense.

Smellie (smel'i), WILLIAM, naturalist and general writer, born at Edinburgh about 1740; died there in 1795. In 1765 he commenced business as a printer on his own account, and compiled and conducted the first editions of the *Encyclopædia Britannica*, which began to be published in numbers at Edinburgh in 1771, and was completed in three vols. quarto. In 1780 he gave to the world the first part of his translation of *Buffon's Natural History*. He wrote a number of treatises on various subjects relating to natural history, which in a collected or emended form were published under the title of the *Philosophy of Natural History;* also memoirs of Lord Kames, Dr. John Gregory, and David Hume.

Smelt, a small but delicious European fish, the *Osmērus eperlānus*, allied to the salmon, inhabiting the salt water about the mouths of rivers. It is of a silvery-white color, the head and body being semi-transparent, and is from 4 to 8 inches long. It inhabits fresh water from August to May, and after spawning returns to the sea. When first taken out of the water smelts have a strong smell of cucumber. It is called also the *sperling*, or *sparling*. The American smelt is the *Osmērus viridescens*, which inhabits the coasts of New England: but the name is given in America



Surf Smelt.

also to other fishes. The name of *sand smelt* is given to the *Atherīna presbyter*, a small fish allied to the mullets and climbing perches. It averages about 6 inches in length, and is of a pale pink color, with black spots on the head and back. This fish is most plentiful on the southern coasts of Britain, and is sought after chiefly for bait, but also as a food-fish. The flesh is very delicate.

Smelting, the process by which a metal is obtained from its ore in a melted state by applying great heat. Iron is smelted in lofty furnaces known as *blast-furnaces*.

Smethwick (smeth'ik), a manufacturing town in the parliamentary division of Staffordshire, England, 3½ miles N. W. of Birmingham. It has extensive glass-works, chemical works, engineering and machine works, iron-foundries, rivet and tube works, safe manufactories, and others. Pop. 70,681.

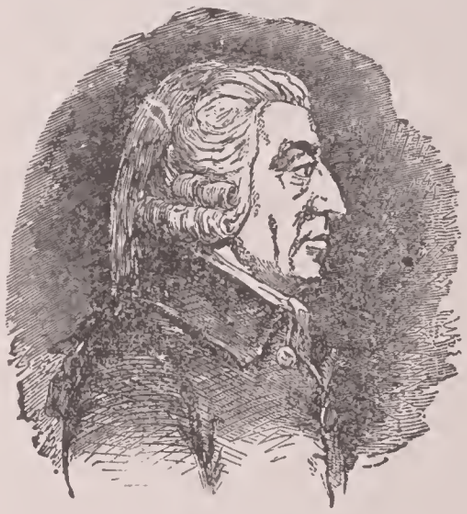
Smew (smū; *Mergellus albellus*), a swimming bird, nearly allied to the goosanders but with a shorter bill. It is abundant on the north coast of Asia and in some parts of Europe. It flies well, but has an awkward gait on land. Its average length is from 15 to 18 inches.

Smilaceæ (smī-lā'se-ē), a nat. order of endogenous plants, belonging to the subclass Dictyogenæ, or those having reticulated leaves. They are mostly climbing plants, with woody stems and small unisexual flowers. They are found in small quantities in most parts of the world except in Africa. The genus *Smilax* embraces the various species of sarsaparilla. The tubers of *Smilax China* and of *Roxburghia viridiflora* are used for food.

Smiles (smīlz), SAMUEL, author, was born at Haddington, Scotland, in 1816, and educated for the medical profession. He practiced for some years as a surgeon at Leeds, when he became editor of the Leeds Mercury. In 1845 he became secretary to the Leeds and Thirsk Railway, and in 1852 to the South-eastern Railway, from which he retired in 1866. He was author of many works on industrial enterprise, the chief of which are: *Life of George Stephenson* (1859); *Self-Help* (1860); *Workmen's Earnings, Strikes and Wages* (1861); *Lives of the Engineers* (1862); *Industrial Biography* (1863); *Lives of Boulton and Watt* (1865); *The Huguenots, their Settlements, Churches, and Industries in England and Ireland* (1867); *Character* (1871); *The Huguenots in France after the Revocation of the Edict of Nantes* (1874); *Thrift* (1875); *Self-Effort* (1889). These works are characterized by their good moral teaching, they are written in a clear and simple style, and many of them have been translated into various European languages. The University of Edinburgh conferred the degree of LL.D. on Smiles in 1878. He died in 1904.

Smirke (smerk), ROBERT, an English painter, born in 1752; died in 1845. He was elected a member of the Royal Academy in 1792. His pictures are generally of small size, and a large proportion of them are illustrations for books, the Scriptures, Shakespeare, English history, *Don Quixote*, etc., furnishing subjects.— His sons, SIR ROBERT SMIRKE (1780-1867), and SYDNEY SMIRKE (1799-1877), had considerable reputations as architects.

Smith, ADAM, a distinguished writer on political economy and on morals, was the only son of Adam Smith, controller of the customs at Kirkcaldy, where he was born June 5, 1723, a few months after the death of his father. After leaving Kirkcaldy school he proceeded in 1737 to the University of Edinburgh, and to Baliol College, Oxford, in 1740. In 1748 he took up his abode in Edinburgh, and in 1751 he was appointed professor of logic at Glasgow, and in the next year of moral philosophy at the same university. His first publication, *The Theory of Moral Sentiments*, appeared in 1759, and was most favorably received. His theory makes sympathy the foundation of all our moral sentiments. To this work he afterwards added an *Essay on the Origin of Languages*. In 1764 he attended the Duke of Buccleuch on his travels, and during a long stay in France became acquainted with Turgot, Necker, D'Alembert, and others. On his return to Scotland in



Adam Smith.

1766 he retired with his mother to Kirkcaldy, where, after ten years of close study, he wrote his celebrated *Inquiry into the Nature and Causes of the Wealth of Nations* (two vols. 4to, 1776). This work may be deemed the formal precursor of the modern science of economics. (See *Political Economy.*) About two years later he obtained the lucrative post of commissioner of customs in Scotland. In 1787 he was chosen rector of Glasgow University. He died in July, 1790. Adam Smith was a man of much simplicity of character, and of a kind and benignant disposition. Numerous editions both of the *Moral Sentiments* and the *Wealth of Nations* have been published. Of the former the sixth edition, published in the year of the author's death, contained considerable additions and corrections. This work was translated into French by the Marquise de

Condorcet. A volume of additions and corrections to the first two editions of the *Wealth of Nations* appeared in 1784, and was included in the third edition, published in the same year. The best edition of this work is that with a life of the author, an introductory discourse, notes, and supplementary dissertations by John Ramsay Macculloch (four vols. 1828, often reprinted). The *Wealth of Nations* has been translated into most European languages.

Smith, ALBERT, an English writer, born at Chertsey in 1816, and educated at Merchant Taylors' School. After studying and devoting himself to the practice of medicine for some time, he turned his attention to literature, and produced a number of humorous works, such as *The Adventures of Mr. Ledbury; The Scattergood Family; Christopher Tadpole; The Pottleton Legacy*, etc. But his greatest success was achieved in his entertainments, his panorama of Mont Blanc being an especial favorite. He died in 1860.

Smith, ALEXANDER, poet and essayist, was born at Kilmarnock, Scotland, in 1830; died at Wardie, near Edinburgh, in 1867. His father was a pattern-designer, and the son adopted the same occupation, and removed to Glasgow for employment and intellectual improvement. Before he had reached his twentieth year he had written, and in 1851-52 he published, his *Life Drama*, a work which attracted (deservedly) a good deal of attention. In 1854 he was appointed secretary of the University of Edinburgh, and the following year produced, in conjunction with Sydney Dobell, a volume of *Sonnets on the War*. This was followed in 1857 by his *City Poems*, to which succeeded his longest and best poetical work, *Edwin of Deira* (1861). He subsequently became an active contributor to magazine literature. In 1863 he published a collection of papers entitled *Dreamthorp*, which was succeeded by *A Summer in Skye* (1865) and *Alfred Hagart's Household* (1865). He also edited the Globe edition of Burns's works, and wrote for it an excellent memoir of the poet.

Smith, CHARLES EMORY, journalist, born at Mansfield, Connecticut, in 1842. He was an editor in Albany 1865-80, and was engaged on the Philadelphia *Press* after 1880, becoming proprietor of this paper. He served as United States minister to Russia 1890-92, and was made postmaster-general in 1898. He died Jan. 19, 1908.

Smith, FRANCIS HOPKINSON, author and engineer, was born at Baltimore, Maryland, Oct. 23, 1838. He studied mechanical engineering, and did some notable work as an engineer, building the Race Rock lighthouse of New London and the foundation for the colossal statue of Liberty in New York harbor. He also won considerable reputation as a water-color artist and an illustrator and lecturer on art. His highest fame, however, rests upon his able novels, among which are the popular *Colonel Carter of Cartersville, Tom Grogan, The Fortunes of Oliver Horn, The Romance of an Old-Fashioned Gentleman*, etc. He produced also various other works, such as *Gondola Days, Venice of To-Day, American Illustrators*, etc. He died April 7, 1915.

Smith, GEORGE, a distinguished assyriologist, born about 1840; began life as an engraver, but having studied the cuneiform inscriptions of Nineveh, obtained an appointment in the British Museum (1867). A few years later he published the *Annals of Assurbanipal*. In 1872 he made known his striking discovery of a series of tablets in the British Museum containing, among other records, the Babylonian legend of the flood. This led to his making two expeditions to the site of Nineveh, resulting in the finding of inscriptions completing portions previously discovered. Particulars of these journeys are recorded in his *Assyrian Discoveries*, published in 1875, and other results were contained in his *Chaldean Account of Genesis* (1876). In 1876 he made another journey to the East for the purpose of continuing his explorations, but died at Aleppo. He wrote, among other works, concise histories of Assyria and Babylon.

Smith, GERRITT, philanthropist, born at Utica, New York, in 1797; was graduated from Hamilton College in 1818, and studied law. Inheriting a very large landed estate, he distributed nearly 200,000 acres of it among the poor, without distinction of color. He was also an ardent advocate of temperance and other reforms and an active member of the Anti-Slavery Society. He was twice nominated for governor of New York, was a member of Congress 1853-54, and gave pecuniary aid to John Brown, though he does not seem to have taken part in the affair at Harper's Ferry. With Horace Greeley he signed the bail-bond of Jefferson Davis in 1867. He died December 28, 1874.

Smith, GOLDWIN, an English historical writer, born at Reading, Berks, in 1823, was educated at Eton and Oxford, where he was graduated first-class in classics in 1845 and became fel-

low of University College in 1847. He also held the post of regius professor of history in the university from 1858 to 1868. As a lecturer he attracted great attention both on account of his strongly democratic views and his striking originality. Having during the American Civil war strongly defended the cause of the North, he was at the close of the war invited to visit the States to deliver a course of lectures, and his visit resulted in his accepting the professorship of history at Cornell University, New York. He resigned the appointment in 1871, and was appointed member of the senate of the University of Toronto, where he afterward resided. Among his chief works are: *Lectures on Modern History* (1861); *The Empire*, a series of letters (1863); *Speeches and Letters on the Rebellion* (1865); *Three English Statesmen* (Pym, Cromwell, and Pitt) (1867); *Political History of the United States* (1893); *Guesses at the Riddle of Existence* (1897); *The United Kingdom* (1899). He died June 7, 1910.

Smith, Horace and James, the joint-authors of the celebrated *Rejected Addresses*, were born in London, James in 1775, and Horace in 1779. James was a lawyer, Horace a stock-broker, but both were of a literary turn, and frequently contributed to periodicals. In 1812 the competition started by the management for the best poetical address to be read at the opening of Drury Lane Theater, when rebuilt after the fire, suggested to the Smiths the idea of producing a collection of parodies of the most noted writers of the day, under the designation of the *Rejected Addresses*. The work was hailed with enthusiastic applause, and rapidly ran through numerous editions. Horace also wrote several novels. James died in 1839, Horace in 1849.

Smith, Sir James Edward, an English botanist, born in 1759; died in 1828. He studied medicine at Edinburgh, took the degree of M.D. at Leyden, and practiced his profession at London, and subsequently at Norwich. The Linnæan Society, of which he continued president till his death, was founded by him in conjunction with others in 1788. He was knighted in 1814. His principal works are *English Botany*, *Flora Britannica*, and the *English Flora*.

Smith, John (commonly known as Captain John Smith), one of the founders of the English colony in Virginia, was born at Willoughby, Lincolnshire, in 1580. After many adventures as a soldier of fortune in Europe, Asia, and Africa, he joined in the project to colonize Virginia. The first expedition, which left London in 1606, consisted of three ships and about 180 colonists and sailors. Dissensions broke out before they had reached their destination, and Smith was condemned to be hanged; but he escaped this fate, and became an active member of the colony. He made important geographical discoveries, obtained supplies from the natives, and was finally intrusted with the guidance of the colony, which he managed with much skill and energy, and to him was largely due its success. For a time he was a prisoner among the Indians; but the story of Pocahontas connected with this, like others of Smith's adventures, has been much questioned. In 1609 an accident obliged him to return to England. He subsequently visited the New England coast for the purpose of trade, and was taken prisoner by a French ship. He died in 1631. He published *A True Relation of the Events Connected with the Colonization of Virginia; Map of Virginia, with a Description of the Country; Description of New England; General History of Virginia*, etc.

Smith, John Pye, an English divine and theologian, born in 1774, became an Independent clergyman, and was long connected with the theological academy at Homerton; died in 1851. He wrote treatises on the *Divinity of Christ; On the Harmony of Geology with Revealed Religion; Scripture Testimony to the Messiah*, etc.

Smith, Joseph, founder of the Mormons. See *Mormons*.

Smith, Robert Angus, born at Glasgow in 1817; died in 1884. He was educated at Glasgow, and subsequently studied chemistry under Liebig at Giessen. After his return to England he made an important report on the sanitary condition of the towns of Lancashire, and his report to the British Association (1848) on the air and water of towns brought the subject into great prominence. Another report of his was on the state of the atmosphere in metalliferous mines. His special investigations into the quality of the air of towns led to his appointment as inspector-general of the alkali works of the United Kingdom. He was also inspector under the Rivers Pollution Act for England and Scotland. The degree of LL.D. was conferred upon him in 1882 by the University of Edinburgh. He wrote a *Life of Dalton, and History of the Atomic Theory up to His Time; Air and Rain; Beginnings of a Chemical Climatology; Loch Etive, and the Sons of Uisnach; Science in Early Manchester*, etc.

Smith, Samuel Francis, Baptist divine, born at Boston in 1808; died November 16, 1895. He edited the *Christian Review* and the *Missionary Magazine*, and was the author of the national song *America*. He also wrote *The Morning Light is Breaking* and other popular hymns and songs.

Smith, Sydney, an English clergyman, noted for his wit and humor, was born at Woodford, Essex, in 1771; died in February, 1845. Educated at Winchester School, Sydney in 1789 entered New College, Oxford, where he took his degree of M.A. in 1796, becoming fellow a few years afterwards. In 1797 he obtained the curacy of Netheravon, a village on Salisbury Plain, where he passed a secluded life for about two years. He then went to Edinburgh as tutor to a young gentleman, continued there for five years, and was one of the founders in 1802 of the *Edinburgh Review*, being also one of its most influential contributors. In 1804 he removed to London, about the same time married, and became renowned as one of the wittiest and most genial of men. In 1806 he was presented to the living of Foston-le-Clay, in Yorkshire. In 1807 appeared anonymously his celebrated *Letters of Peter Plymley*, intended to further the cause of Catholic emancipation. His liberal views on politics excluded him for a long time from church preferment; but in 1828 he was presented to the rectory of Combe Florey, in Somersetshire, and in 1831, during the ministry of Earl Grey, he became one of the canons of St. Paul's, London, where he thenceforth resided. A few years before his death a collected edition of his writings was published under his own supervision, including papers contributed to the *Edinburgh Review*, *Sketches of Moral Philosophy*, etc.

Smith, Thomas Southwood, physician and sanitary reformer, was born at Martock, Somersetshire, in 1778, and studied medicine at Edinburgh. He first settled as a physician at Yeovil, but in 1820 went to London, and was in 1825 appointed physician to the London Fever Hospital, and somewhat earlier to the Eastern Dispensary. He spent several years visiting the wards of the former, and the squalid houses of the patients of the latter, and embodied his experience in a *Treatise on Fever* (1830), which has been described by a competent authority as the best work on the subject that has ever been written. In 1832 he was appointed one of the commissioners to inquire into the condition of factory children, and his report led to the passage of the Factory Act, which put an end to the inhuman treatment to which children had been subjected in factories up to that time. His inquiry into the condition of children and young persons employed in mines led to the exclusion of children and women from British mines. In 1846 his report on the means requisite for the improvement of the health of the metropolis resulted in the Public Health Act of 1848. He also did immense service to the cause of science by his reports on cholera and quarantine. Dr. Smith died at Florence in 1861.

Smith, William, the 'father of English geology,' was born at Churchhill, in Oxfordshire, in 1769; died at Northampton in 1839. Acting successively as land surveyor, mining surveyor, and canal engineer, he was led to indulge in many speculations of a geological nature. He became convinced that each stratum contained its own peculiar fossils, and might be discriminated by them, and in 1815 he was able to submit a complete colored map of the strata of England and Wales to the Society of Arts, and received the premium of £50 which had for several years been offered for such a map. His fame as an original discoverer was now secure; but becoming involved in pecuniary difficulties he was obliged to part with his geological collection to government for £700. Subsequently a pension was granted to him by government.

Smith, William, classical scholar, was born at London in 1813. He edited the well-known series of *Classical and Biblical Dictionaries*, and wrote many educational books. He was for some time classical examiner in the University of London, and professor of classics in New College, London, and after 1867 was editor of the *Quarterly Review*. He died October 7, 1893.

Smith, William Robertson, biblical scholar, was born at Keig, Aberdeenshire, in 1844, and educated at the University of Aberdeen, subsequently spending some time at the New College, Edinburgh, and at the Universities of Bonn and Göttingen. From 1868 to 1870 he held the post of assistant-professor of physics at Edinburgh. Appointed in 1878 professor of Hebrew in the Free Church College, Aberdeen, he was removed from the post by the General Assembly in 1881 on account of his critical views on the Old Testament. From 1881 Professor Smith was connected with the editorship of the *Encyclopædia Britannica*, and after the death of Professor Baynes was editor-in-chief. He was a member of the Old Testament Re-

vision Committee, in 1879-80 traveled in Arabia, in 1883 succeeded Professor Palmer as professor of Arabic at Cambridge, and in 1886 was appointed librarian of Cambridge University. He was the author of several works relating to Jewish history. He died in 1894.

Smith, SIR WILLIAM SIDNEY, born at Westminster, England, in 1765; died in 1841. He entered the navy at the age of twelve, received his lieutenancy at sixteen, and when nineteen was created post-captain. After serving with distinction as a volunteer in the Swedish navy against Russia, and then against France under Lord Hood, he returned to England, and received the command of the *Diamond*, for the purpose of cruising with a small flotilla against the French. He was made prisoner in an attempt to cut out a vessel at Havre, and was detained in confinement for two years, but contrived to make his escape. Appointed then to the *Tiger*, Sir Sidney did good service in Syria, and subsequently in Egypt against Bonaparte, receiving a severe wound at the battle of Alexandria. On his return to England various marks of distinction were bestowed on him, and in 1802 he entered parliament as member for Rochester. He was created rear-admiral of the blue in 1805, and in 1806, as commander of a small squadron, inflicted signal injuries on the French off the coast of Naples. Next year he accompanied Admiral Duckworth to the Dardanelles, where he distinguished himself by the destruction of a Turkish squadron. He was made vice-admiral in 1810, admiral in 1821, and in 1830, on the accession of William IV, succeeded him as lieutenant-general of marines. As a reward for his services he received a pension of £1000 a year and the decoration of K.C.B.

Smith College, a non-sectarian educational institution for women, founded in 1871 at Northampton, Massachusetts. It had in 1911, 138 instructors and 1500 students and an endowment of $1.200,000.

Smithfield (smith'fēld), a square in London, a little north of Newgate and west of Aldersgate, in which, until a few years ago, the only market in London for live stock was held. It was outside the old city walls, and before the days of Tyburn was the place of public executions. In the time of religious intolerance it obtained an evil repute for its burnings in the name of religion. Bartholomew Fair, so often mentioned in English literature, was held at Smithfield. (See *Bartholomew Fair.*) A cattle market was held here as far back as 1150. On the site of the old market there has been erected a fine meat and poultry market.

Smith's Falls, a town of Ontario, Canada, 41 miles s. w. of Ottawa. It has varied manufactures. Pop. 6551.

Smithsonian Institution, a scientific institute in Washington, organized by Act of Congress in 1846, to carry into effect the provisions of the will of James Smithson, the founder. Smithson was a natural son of the Duke of Northumberland; was educated at Oxford, and was in 1790 elected a fellow of the Royal Society. He died at Genoa in 1829, leaving his property (worth £120,000) to his nephew, with the condition that if the latter died without issue the property was to go to the United States to found an establishment for the increase and diffusion of knowledge. In 1835 the nephew died childless, and in 1838 the sum of $515,169 was paid into the treasury of the United States. In 1846 the interest on this sum (the principal itself must remain untouched) was applied to the erection of a suitable building, with apartments for the reception and arrangement of objects of natural history, including a geological and mineralogical cabinet, a chemical laboratory, a library, a gallery of art, and the necessary lecture-rooms. The building is one of the finest in Washington, and the collections of natural history, ethnological and other material of the highest value. The United States Weather Bureau grew out of its department of meteorology and the Fish Commission was founded in connection with its work on ichthyology. A portion of the funds of the institution is devoted to scientific researches and the publication of works too expensive for private enterprise. Three series of publications are issued: *Contributions to Knowledge, Miscellaneous Collections*, and *Annual Reports*. The institution embraces the National Museum, which is, however, wholly maintained by the government. The institution is administered by regents, composed of the chief-justice of the Supreme Court, three members of the Senate and three of the House of Representatives, with six other persons not members of Congress. The president, vice-president, and members of the cabinet for the time being have the position of governors or visitors of the institution, the president being *ex officio* at the head.

Smoke (smōk), the exhalation or visible vapor that arises from a burning substance. In its more extended

sense the word smoke is applied to all the volatile products of combustion, which consist of gaseous exhalations charged with minute portions of carbonaceous matter or soot; but, as often used in reference to what are called smoke-consuming furnaces, the term is frequently employed to express merely the carbonaceous matter which is held in suspension by the gases. Many efforts have been made to prevent nuisance from smoke in cities, but much still needs to be done before this will be effectually accomplished, especially in Pittsburgh, Pennsylvania, and other manufacturing cities in which only bituminous coal is used.

Smokeless Powder, an explosive which has the advantage over ordinary gunpowder of burning without residue and thus emitting no smoke. The dense clouds of smoke given off by gunpowder have long been a serious disadvantage in warfare, and it has been generally replaced by this new kind of explosive. Smokeless powder also burns much more quickly than gunpowder and by its rapid action gives higher velocity to projectiles. Nearly all smokeless powders consist essentially of gun-cotton or other lower forms of nitro-cotton, there being three kinds of the powders: gun-cotton, or nitro-cellulose; the same mixed with nitro-glycerine; and the same again with a nitro-derivative of hydrocarbons, such as picric acid and the various picrates. Most of modern nations have adopted some variety of smokeless powder, known variously as Cordite, Indurite, Ballistite, Schultze Powder, Cannonite, Amberite, Walsrode, etc. In addition to artillery ammunition, smokeless powders are made for military and sporting rifles.

Smoke-plant, a beautiful deciduous South European shrub, *Rhus cotinus*, nat. order Anacardiaceæ, yielding the yellow dyewood called young fustic, and used also in tanning.

Smolensk (smâ-lyensk'), a government in Russia, west of Moscow; area, 21,632 square miles; pop. 1,762,400. It consists of extensive plains, and belongs partly to the basin of the Baltic, but much more to the Black Sea. The climate, though cold, is healthy, and the soil tolerably fertile, producing good crops of rye, hemp and flax, hops and tobacco. The pastures are excellent, and the forests yield excellent timber.— SMOLENSK, the capital, is situated on the Dnieper, 250 miles W. S. W. of Moscow, and is surrounded by old walls and towers. The interior contains much open ground, partly occupied as gardens. The principal buildings are the cathedral, episcopal palace, a diocesan seminary, gymnasium, etc. The manufactures consist of linen, leather, hats, carpets, and soap; and the trade is chiefly in corn and hemp. Smolensk was a place of importance as early as the ninth century, and was partly burned by the French in 1812. Pop. 57,405.

Smollett (smol'et), TOBIAS GEORGE, novelist and miscellaneous writer, was born near Renton in Dumbartonshire in 1721; died at Monte Nuovo, near Leghorn, in 1771. He was educated at the University of Glasgow, and was apprenticed to a surgeon. In 1740 he went to London and obtained the situation of surgeon's mate to one of the ships that went out in the unfortunate expedition to Carthagena in 1741 under Admiral Vernon. Of this affair he gave an account in his *Compendium of Voyages and Travels* (seven vols. 12mo, 1757). Disgusted with the navy, Smollett quitted the service, and resided for some time in Jamaica. On his return to London, in 1746, he heard of the barbarities of the Duke of Cumberland in the north of Scotland, and gave utterance to his indignation in the well-known ode entitled *The Tears of Scotland.* In the same year he published his *Advice: a Satire;* and in 1747 appeared his *Reproof: a Satire*, being the second part of *The Advice.* In 1748 he published his *Adventures of Rodcrick Random*, a novel which brought him both fame and fortune. He went to Paris in 1750, and about this time wrote his *Adventures of Peregrine Pickle*, which appeared in 1751. He now obtained the degree of M.D., but never succeeded in practice. In 1753 he published his *Count Fathom*, a work neither so ably written nor so popular as its predecessors. In 1755 he brought out a new translation of *Don Quixote.* Soon after this he was induced to take the chief management of the Tory organ, the *Critical Review.* In 1757 he produced *The Reprisal*, a comedy in two acts, which proved a success. In 1758 appeared his *History of England, from Julius Cæsar to the Treaty of Aix-la-Chapelle in 1748.* For a libel in the *Critical Review* he was sentenced to pay a fine of £100 and to suffer three months' imprisonment. During his confinement he composed his *Adventures of Sir Lancelot Greaves* (published in 1762). In 1761, 1762, and 1765 appeared his *Continuation of the History of England down to 1765*, since often reprinted as a continuation of *Hume's History.* In 1766, after a residence of about two years on the Continent, he published his *Travels through France and Italy;* and in 1767

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SMYRNA, LOOKING EAST FROM THE MOUNTAINS

A picturesque view of the ancient city well known to Bible students. It recently became prominent in the public view on account of the refuge sought there by Greek soldiers after their defeat by the Turkish army led by Mustafa Kemal Pasha. The city was set on fire.

his *History and Adventures of an Atom*. He again visited Italy in 1770, and near Leghorn he wrote his *Humphry Clinker*, which is regarded as the best of all his works. The humor of Smollett is of the broad, full-flavored kind, not seldom degenerating into burlesque; his characters are well marked and varied; and though his work is frequently coarse and vulgar, it has had much influence on English fiction.

Smolt. See *Salmon*.

Smuggling (smug'ling), the practice of defrauding the revenue by the clandestine introduction of articles into consumption without paying the duties chargeable upon them. It has been a common practice in all countries laying a duty on imported goods, and one that has proved very difficult to break up. Its latest phase in the United States is the bringing in of dutiable goods in the trunks or on the person of travelers. Many methods of thus evading the revenue are practiced, and often with success, despite the vigilance of the officials.

Smut, a disease, also called *Dust-brand*, incidental to cultivated grain, by which the farina of the grain, together with its proper integuments, and even part of the husk, is converted into a black, soot-like powder. It does not affect the whole body of the crop. Some attribute the smut to the richness of the soil, and others consider it as a hereditary disease transmitted by one generation to another through the seed. It is produced by a minute fungus, *Ustilāgo* or *Urēdo segĕtum*. The safest mode for the farmer to pursue to prevent smut, is never to sow grain from a field in which the smut has prevailed. See also *Bunt* and *Ergot*.

Smyrna (smėr'na; *Turkish*, *Izmêr*), an ancient city and seaport of Asiatic Turkey, on the west coast of Asia Minor, at the head of the gulf of the same name. The appearance of the city from the sea is extremely attractive, but a closer inspection dissipates the illusion. The houses, mostly built of wood, are mean and fragile looking; the streets close and filthy, and filled by intolerable stenches proceeding from the sewers and drains. The city is divided into four quarters — Frank, Turk, Jew and Armenian. There is an English hospital, church, and burying-ground, one or two English schools, and numerous schools for Turks, Greeks, and others; all sects and faiths having complete toleration. Smyrna has been for centuries the most important place of trade in Asia Minor. The chief imports are cotton manufactures, woolen cloths, colonial goods, iron, steel, and hardware goods. The principal exports are dried fruits (especially figs), cotton, silk, goats'-hair, sheep and camels' wool, valonia, madder-root, yellow-berries, sponges and opium. The origin of Smyrna is lost in antiquity. It laid claim to the honor of being the birthplace of Homer, and no doubt was a Greek city as early as the date assigned to the poet. It was afterwards taken by the Lydians, was restored by Antigonus

and Lysimachus, generals of Alexander the Great, became the capital of Antigonus and a flourishing city. During the Roman civil wars it was taken and partly destroyed by Dolabella, but soon recovered. It early received Christianity, and was one of the 'seven churches' of Asia. In the thirteenth century only the ruins of its former splendor were left; but after the Turks became masters of the country it revived. In Sept., 1922, the Greeks were defeated here by the Turks. Pop. estimated at 375,000.

Smyrna, Gulf of, formerly the Hermæan Gulf, an inlet of the Ægean Sea on the coast of Asiatic Turkey, so-called from the town of Smyrna, which stands at its head. It is 40 miles in length by 20 at its broadest part, and contains several islands and affords good anchorage.

Snail (snāl), a slimy, slow-creeping, air-breathing, gasteropod mollusc belonging to the genus *Helix* of Linnæus, now raised into the family Helicidæ, and differing from the slugs (Limacidæ) chiefly in having a spiral shell. The head is furnished with four retractile horns or tentacles; and on the superior pair, at the extremity, the eyes are placed. The sexes are united in the same individual, but the union of two

such hermaphrodite individuals is necessary for fertilization. The common garden snail (*Helix aspersa*) is the most familiar species of the typical genus. The mischief done by it to garden produce on which it feeds is very extensive. Nearly equally well known is the edible snail (*H. Pomatia*), largely found in France, and cultivated there and elsewhere for food purposes.

Snake (snāk), the order of Ophidia, comprises scaly reptiles, without feet, which move by alternate folds of their slender body. There are about 120 American species, of which several are venomous. See *Serpents.*

Snake-bird. See *Darter.*

Snake-eel, a popular name of the fishes which constitute the family Ophisuridæ of some naturalists, but which others class with the true eels in the family Murænidæ, from the tail tapering to a point like that of a snake. They are natives of warm seas. One species (*Ophisūrus serpens*), of about 6 feet long, is found in the Mediterranean.

Snake-fish. See *Band-fish.*

Snake Indians. See *Shoshones.*

Snake River. See *Lewis River.*

Snakeroot (snāk'röt), the popular name of numerous American plants of different species and genera, most of which are, or formerly were, reputed to be efficacious as remedies for snake bites. See *Aristolochia* and *Senega.*

Snake-stone, a popular name of those fossils otherwise called Ammonites. The name is also given to certain small rounded pieces of stone, or other hard substance, popularly believed to be efficacious in curing snake bites.

Snake-wood, the wood of the *Strychnos colubrīna*, nat. order Loganiaceæ, a tree growing in India, Java, and other parts of the East, having a bitter taste, and supposed to be a certain remedy for the bite of the hooded serpent. Also the Demerara letter-wood (*Brosimum Aubletii*), a tree of the nat. order Artocarpaceæ. It has this name from the heart-wood being mottled with irregularly shaped dark spots. The timber is excessively hard.

Snapdragon, a genus of annual or perennial plants of the natural order Scrophulariaceæ. Common snapdragon (*antirrhinum majus*) is much cultivated for flower beds and borders. It is a native of Europe. The name was given it because of the peculiarity of the blossoms which, by pressing between the finger and thumb, may be made to open and shut like a mouth. The great snapdragon grows to a height of two feet. It is a very showy garden plant; the flowers are large and pink-colored; the lower lip is white and the mouth yellow, with a gibbous prominence at the base beneath. Other varieties have scarlet and white flowers. Also a game in which raisins are snatched from burning liquor.

Snapping-turtle, a species of freshwater tortoise belonging to the genus *Chelydra* (*C. serpentīna*), common to all parts of the United States. It feeds on small animals, is bold and fierce, and is so-named from its propensity to snap at everything within its reach. Another tortoise (*Macroclemmys Temminckii*) of similar habits, but larger (sometimes weighing 100 lbs.), receives the same name.

Sneehätten (snā'het-en; 'Snow-hat'), a mountain in Norway with an altitude of 7566 ft. It rises from the midst of the Dovrefield, an extensive tract of country, from 40 to 50 miles in extent in every direction, and between 3000 and 4000 feet above the sea-level.

Sneek (snāk), a town of Holland, in the province of Friesland. It is partly surrounded by a ditch and an earthen rampart, and is intersected by numerous canals. It has roperies, tanneries, foundries, soap-works, boat-building yards, etc. Pop. 12,075.

Sneeze-wood, a South African tree (*Pteroxylon utile*), nat. order Sapindaceæ, yielding a solid, strong, durable timber rivaling mahogany in beauty. Its dust causes sneezing, so that it is troublesome to work.

Sneezewort (snēz'wurt; *Helenium autumnale*) grows in damp places. The flowers are large, numerous, terminal, with drooping rays. The plant is very bitter.

Sneezing, is a convulsive action of the respiratory organs brought on commonly by irritation of the nostrils. It is preceded by a deep inspiration, which fills the lungs and then forces the air violently through the nose. Sneezing produced in the ordinary way is a natural and healthy action, throwing off automatically from the delicate membrane of the nostrils whatever irritable or offensive material may chance to be lodged there. When it becomes violent, recourse must be had to soothing the nasal membrane by the application of warm milk and water, or decoction of poppies. The custom of blessing persons when they

sneeze is very ancient and very widely spread.

Sniatyn (shnyä′tin), a town of Austria, in Galicia, on the Pruth. It was formerly a frontier stronghold, and has extensive tanneries, and a considerable trade in horses and cattle. Pop. 11,500.

Snipe (snīp), a common name for those grallatorial birds which form the genus *Scolŏpax*. The common snipe (*Scolŏpax gallinăgo*) of Europe is a beautifully marked bird, about 17 inches long, the bill being nearly 3 inches. It is remarkable for its peculiar bleating cry, and the drumming-like noise it makes in summer. The jack snipe (*Scolŏpax gallinŭla*) closely resembles the common snipe in its general habits and appearance. In North America there are several species of snipe, Wilson's snipe (*S. Wilsonii*) being one of the chief. It is about equal in size to the common snipe of Europe and much resembles it in plumage. It is abundant in summer in the North and in winter in the South, and is in much request for the table. The name of sea snipe is sometimes given to the dunlin, while the name summer snipe is applied to the common sandpiper (which see).

Common Snipe (*Scolŏpax gallinăgo*).

Snipe fish. See *Bellows-fish.*

Snizort (snē′zort), Loch, a sea loch in the N. W. of the island of Skye, Scotland.

Snorri Sturluson (snor′rē stör′lösun), an Icelandic poet and historian, born in 1178. Tracing his descent from the kings of Norway, he early turned his attention to the history of their doings, and made a collection of sagas entitled the *Heimskringla, or the Ring of the World*, in which are interspersed songs of his own composing. It contains a record of the Norwegian kings from the earliest time to the death of Magnus Erlingsson (1177), and was first printed in 1697. It has been translated into several languages. Snorri became chief judge of Iceland, but his ambitious and intriguing character led to his assassination in 1241. His name is also connected with the *prose Edda*. See *Edda*.

Snow (snō). Snow-flakes are assemblages of minute crystals of ice; they are formed when the temperature in a region of air containing a considerable quantity of aqueous vapor is lowered below the freezing-point. The particles of moisture contained in the atmosphere are then condensed and frozen, and form flakes, which descend to the earth's surface. Each flake is composed of a number of minute crystals of ice, which present countless modifications of the hexagonal system. They have great diversities of density, and display innumerable varieties of the most beautiful forms. These crystals usually adhere together to form an irregular cluster; and consequently the incident rays of light, which are refracted and reflected so as to present individually the prismatic colors, are scattered after reflection in all directions, and combine to give to the eye the color sensation of *white*. When sufficient pressure is applied the slightly adhering crystals are brought into true molecular contact, and the snow, losing its white color, assumes the form of ice. Snow answers many valuable purposes in the economy of nature. Accumulated upon high regions it serves to feed, by its gradual melting, streams of running water, which a sudden increase of water, in the form of rain, would convert into destructive torrents or standing pools; and in many countries it tempers the burning heats of summer by previously cooling the breezes which pass over them. In severer climates it serves as a defense against the rigors of winter by protecting vegetation from the frost, and by affording a shelter to animals which bury themselves under it. Even in more temperate climates it is found that vegetation suffers more from an open winter than when the fields, during that season, lie hid beneath a snowy covering. As for what is known as *red snow*, see *Protococcus*.

Snow, a vessel equipped with two masts resembling the main and fore masts of a ship, and a third small mast, just abaft the main-mast, carrying a sail nearly similar to a ship's mizzen.

Snowball-tree, the garden variety of the *Viburnum Opŭlus* which belongs to the natural order Caprifoliaceæ or guelder-rose (which see).

Snowberry, the popular name of tropical American shrubs of the genus *Chiococca*, nat. order Rubiaceæ, suborder Cinchoneæ. The fruit consists of snow-white berries. Also, and in England more usually, applied to *Symphoricarpus racemōsus*, a bushy shrub of the woodbine family, a native of North America, bearing white berries.

Snow-bird, a popular name applied to several species of birds, such as the *Fringilla nivālis* of Europe, the *Fringilla hiemālis* of America, and the snow-bunting.

Snow-bunting, the popular name of *Emberīza* or *Plectrophănes nivālis*, a gregarious passerine bird belonging to the bunting family, a native of the Arctic regions, and common in winter in the United States. It is generally very fat, and is highly esteemed for the table. It visits Northern Europe also in winter, and is supposed to be the harbinger of severe weather. It sings very sweetly, and does not perch, but runs about like the lark.

Snowdon (snō′dun), a mountain range in North Wales, stretching N. N. E. to S. S. W. across Carnarvonshire, from the mouth of the Conway to Tremadoc; length, about 24 miles; average breadth, 6 miles. It attains its greatest height in Snowdon proper, whose loftiest summit — Wyddva, 3571 feet — is the culminating point of South Britain.

Snowdrop, a well-known garden plant of the genus *Galanthus*, the *G. nivālis*, nat. order Amaryllidaceæ. It bears solitary, drooping, and elegant white flowers, which appear early in spring. It is a native of the Alps, but is quite common in gardens in the Northern United States.

Snowdrop Tree (*Halesia tetraptĕra* and *H. diptĕra*), a name of ornamental trees of the Southern United States with flowers like snowdrops, belonging to the styrax family.

Snowflake. See *Leucojum*.

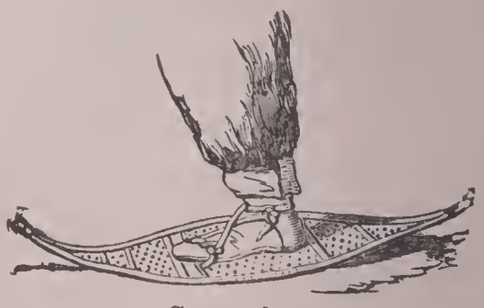
Snow-goose (*Anser hyperboreus*), a species of goose inhabiting the Arctic regions. Its flesh is esteemed excellent.

Snow-line, the limit of perpetual snow, or the line above which mountains are covered with perpetual snow. Since the temperature of the atmosphere continually diminishes as we ascend from the lower into the higher strata, there must be in every latitude a certain limit of elevation at which the temperature of the air is reduced to the freezing-point. This limit is called the snow-line, or line of perpetual congelation, and the mountains which rise above it are always covered with snow. The snow-line varies according to latitude, being highest near the equator and lowest near the poles. Local circumstances, however, affect it, as the configuration of the country, the quantity of snow falling annually, the nature of the prevalent winds, etc. From these circumstances the snow-line is at different heights in the same latitude.

Snow-plant. Same as *Protococcus*.

Snow-plow, an implement for clearing away the snow from roads, railways, etc. There are two kinds: one adapted to be hauled by horses, oxen, etc., on a common highway; the other to be placed in front of a locomotive to clear the rails of snow. A variety of the latter is adapted to street railways. As now made a rotary motion replaces the plowing motion, cutting into and flinging the snow aside.

Snow-shoe, a kind of flat shoe, either made of wood alone, or consisting of a light frame crossed and recrossed by thongs, the broad surface of which prevents the wearer from sinking in the snow. Snow-shoes are usually



Snow-shoe.

from 3 to 4 feet in length, and from 1 to 1½ foot broad across the middle.

Snow-slide, western term for avalanche, which see.

Snowy River, a river of Australia, in New South Wales and Victoria; length, 240 miles, 160 of which are in New South Wales.

Snuff, a powdered preparation of tobacco inhaled through the nose. It is made by grinding, in mortars or mills, the chopped leaves and stalks of tobacco in which fermentation has been induced by moisture and warmth. The tobacco is well dried previous to grinding, and this is carried sometimes so far as to give the snuff the peculiar flavor of the high-dried snuffs, such as the Irish, Welsh, and Scotch. Some varieties, as the rappees, are moist. The admixture of different flavoring agents and delicate scents has given rise to fanciful names

for snuffs, which, the flavor excepted, are identical. Dry snuffs are often adulterated with quicklime, and the moist kinds with ammonia, hellebore, pearl-ash, etc. See *Tobacco*.

Snyders (snī'derz), FRANS, a Flemish painter, born at Antwerp in 1579, studied the rudiments of his art under Breughel and Van Balen. Later he visited Italy, but in 1609 finally took up his abode at Antwerp, and died there in 1657. Snyders, who is considered never to have been surpassed in his delineation of dead game, fish, fruit, etc., excelled also in hunting scenes and combats of wild beasts. He used to work in concert with Rubens. Choice pieces of his are to be found in the collections.

Soane (sōn), SIR JOHN, an English architect, born in 1752, studied at the Royal Academy, was sent to Rome for three years with the Academy pension of £60 a year, and on his return he was employed on many public works. In 1788 he was appointed architect to the Bank of England, and in 1791 clerk of works to St. James' Palace, the Parliament Houses, and other public buildings. In 1794 he drew up plans for the improvement of the House of Lords, but though they were accepted, James Wyatt was engaged to carry them out. He became professor of architecture to the Royal Academy in 1806. He died in 1837, having bequeathed his collection of works of art and £30,000 to the nation. The *Soane Museum* thus formed is housed at 13 Lincoln's Inn Fields, London, and contains antique sculptures, bronzes, gems, models of ancient buildings, a collection of pictures, etc.

Soap (sōp), a chemical compound of common domestic use for washing and cleansing, and also used in medicine, etc. It is a compound resulting from the combination of certain constituents derived from fats, oils, grease of various kinds, both animal and vegetable, with certain salifiable bases, which in household soaps are potash and soda. Chemically speaking, soap may be defined as a salt, more especially one of the alkaline salts of those acids which are present in the common fats and oils, and soluble soaps may be regarded as oleates, stearates, and margarates of sodium and potassium. There are many different kinds of soaps, but those commonly employed may be divided into three classes:—1. Fine white soaps, scented soaps, etc.; 2. Coarse household soaps; 3. Soft soaps. White soaps are generally combinations of olive-oil and carbonate of soda. Perfumes are occasionally added, or various coloring matters stirred in while the soap is semi-fluid. Common household soaps are made chiefly of soda and tallow. Yellow soap is composed of tallow, resin, and soda, to which some palm-oil is occasionally added. Mottled soap is made by simply adding mineral and other colors during the manufacture of ordinary hard soap. Marine soap, which has the property of dissolving as well in salt-water as in fresh, is made of cocoa-nut oil, soda, and water. Soft soaps are generally made with potash instead of soda, and whale, seal, or olive-oil, or the oils of linseed, hemp-seed, rape-seed, etc., with the addition of a little tallow. Excellent soaps are made from palm-oil and soda. Soap is soluble in pure water and in alcohol; the latter solution jellies when concentrated, and is known in medicine under the name of *opodeldoc*, and when evaporated to dryness it forms what is called transparent soap. Medicinal soap, when pure, is prepared from caustic soda, and either olive or almond oil. It is chiefly employed to form pills of a gently aperient antacid action.

Soap-berry, the name applied to the fruit of several species of the genus *Sapindus* (nat. order Sapindaceæ) from their rind containing a saponaceous principle, so that when mixed with water they produce an abundant lather. The fruit is globular, as large as a cherry, inclosing a nut of a shining black color when ripe.

Soap-plant, a name common to several plants used in place of soap, as the *Phalangium pomaridianum*, a California plant, whose bulb, when rubbed on wet clothes, raises a lather, its smell somewhat resembling that of new brown soap.

Soap-stone, steatite. The name is derived from its color, and from the unctuous sensation experienced when the mineral is rubbed between the hands. See *Steatite*.

Soap-wort (*Saponaria*), a genus of plants of the nat. order Caryophyllaceæ; so-called because the bruised leaves produce a lather like soap when agitated in the water. Common soap-wort (*S. officinālis*) is a native of many parts of Europe, and is found on waysides, river-banks, and thickets. In the United States it grows by roadsides from New England to Georgia. It has handsome, pink-like flowers.

Sobies'ki, JOHN. See *John III* (*Sobieski*).

Sobranje, or SOBRANYE (so-brän'ye), the national assembly of Bulgaria (which see).

Soc (sok), SOKE, in law, the power or privilege of holding a court in a district, as in a manor; jurisdiction of causes, and the limits of that jurisdiction.

Socage (sok'ij), or SOCCAGE, in law, a former tenure of lands in England by the performance of certain and determinate service; distinguished both from *knight-service*, in which the render was uncertain, and from *villenage*, where the service was of the meanest kind. Socage has generally been distinguished into *free* and *villein*—*free socage*, where the service was not certain but honorable, and *villein socage*, where the service, though certain, was of a baser nature.

Soccer, or SOCKER, the popular name for Intercollegiate Association Football. It was introduced from Great Britain, taken up by Haverford College, Pa., in 1901, and soon adopted by all the leading colleges. It is now regulated by the Intercollegiate Association Football League, organized in 1906. The game is fast and clean, and dangerous play is barred. No tripping, kicking, or jumping at an opponent is allowed and no player permitted to use his hands to push or hold an antagonist.

Sociable (sō'sha-bl), an open carriage with seats facing each other, and thus convenient for conversation; also a species of tricycle.

Social Democrats, an advanced body of socialists. They originated and are chiefly represented in Germany, where they form a strong political party. The Social Democratic Working Men's Party was established in 1869. In 1875 they formulated a programme, which sets forth that labor is the source of all wealth and all culture, and that the emancipation of labor must be the work of the laboring classes. The party aims at the development of a free state and a socialistic society, the removal of all social and political inequality, the administration of justice free and impartial by the people, and the establishment of a gratuitous and universal system of education. Religion is to be regarded as a private concern merely. The social democrats are a growing body in England and America.

Social Insects, the name applied generally to the species of bees, wasps, hornets, ants, white-ants or termites, etc., which live in communities, and evince in the order of their life a close analogy to societies of mankind.

Socialism (sō'shal-izm), the name applied to various theories of social organization, having for their common aim the abolition of that individual action on which modern societies depend, and the substitution of a regulated system of coöperative action. The word socialism, which originated among the English communists, and was assumed by them to designate their own doctrine, is now employed in a larger sense, not necessarily implying communism or the entire abolition of private property, but applied to any system which requires that the land and the instruments of production shall be the property, not of individuals, but of communities, or associations, or of the government, with the view to an equitable distribution of the products. The earliest forms of socialist philosophy were those promulgated by Sir Robert Owen, St. Simon and Fourier; but it is on the teachings of Karl Marx (q. v.) that most of the platforms of the socialist parties throughout the world are built. Marx preached the overthrow of capitalism and the dictatorship of the proletariat. This philosophy received its first extreme interpretation on a large scale in Russia, following the revolution of 1917 and the coming into power of the Bolsheviki (q. v.) government, headed by Lenine (q. v.).

Socialism had many adherents in Germany, and following the armistice of November, 1918, and the abdication of William II, an effort was made to follow in Russia's footsteps by a forcible overthrow of the government; but this attempt failed with the assassination of Liebknecht, leader of the radical socialists, or Spartacans (see *Spartacus*).

The European war, 1914-18, split the socialists into two groups, the one favoring the war, the other bitterly opposing it. In the United States Debs, candidate for President on the socialist ticket, violently opposed the entrance of the United States into the war, and was imprisoned under the Espionage Act. With Debs as nominee of the party, the Socialists polled 919,799 votes at the presidential election of 1920.

Social Work, often termed SOCIAL WELFARE, SOCIAL SERVICE, etc., is a most important branch of the science of *Sociology;* the objectionable term 'uplift work' has long since been discarded. E. T. Devine, one of its leading experts, well defines its purpose as: 'to provide for individuals when society's established institutions fail them, to supplement such institutions.' 'Social work,' he says, 'may be individual, spontaneous, unorganized, or it may be associated, deliberate, and organized.' The work may be carried on by the govern-

ment, as was done during the World War, by an incorporated society, an informal group or an individual.

Social work was started through the abject poverty and servitude of the operatives of the immensely profitable English textile mills becoming notorious. The English 'Factory Act' was passed by Parliament in 1802. Robert Owen, the wealthy Lanark mill owner, effectively agitated (1815) factory labor reform, as practiced successfully in his own mills. Other humane mill owners followed. Oastler (1829) got the Ten-Hours Act (1833) through, and Factory Commissioners appointed paid inspectors. Then came John Wood, who from 1812 started reduced hours, schools on the premises, dining rooms, etc. Later came the reformers Fielden (1836), Edwards (1847), etc. One factory (1845) already had a surveyor on the premises, schools, loan library, savings bank, etc. In 1867 Parliament passed the Act relating to women and children employed in factories. In 1878 sanitary provisions, safety devices, education, holidays, etc., were enforced. In the United States large factories did not appear till later and the freedom of a republic kept 'predatory wealth' from such objectionable factory conditions till more recent years. Then, with the arrival of the immigrant 'cheap labor' from southern Europe, speaking a foreign tongue, poverty and degradation reached our shores and with it the necessity of social 'betterment' to avoid contamination of the entire nation. Social work then took up such industrial aid as: investigation of relations between employer and employee, labor legislation, hours of work, industrial reform, child labor, factory sanitation and inspection, safety devices, housing, temperance, delinquent children, education, social settlements, 'institutional churches.' Our entry into the World War with its nationalization of industries did much to stamp the workers' co-operation as an axiomatic necessity for efficiency, and *welfare work*, as a corollary, became a national practice.

The Field of Social Service. The terms 'community work' and 'neighborhood work' are usual titles applied to a wide range of social reform. The field includes such problems as housing, fire protection, health and medical service, recreation, care for the newly arrived immigrant. Grouped under these branches are such subjects as child labor, schools, juvenile delinquency, public and private 'relief.' The housing problem facing the social worker is the securing of light, heat, ventilation, fire protection, medical service, good sanitation, decent privacy, proper maintenance. Fire losses in the United States have amounted to fourteen billion dollars in less than fifty years; their prevention would reduce the rents of the working classes. Medical social service should extend to 'after care' of patients discharged from the hospitals, as well as giving instruction concerning 'preventions.' Playgrounds should be made training schools, not 'run themselves.' The games must be taught. Recreation for adults (sewing trades, office workers, etc.) created by the social workers takes the place of loafing. Immigrants, nowadays largely of the lower classes and speaking only foreign languages, must be taught English and learn good manners and habits to become 'assimilated' and good American citizens; and this after factory hours ('schools for citizenship,' etc.).

Social Settlements. These 'training centers' in a city's slums originated in London in 1879 when the students of sociology in the Universities of Oxford and Cambridge determined the best location for learning conditions as well as practice must be *in situ*, so they obtained quarters in the poverty-stricken centers of Whitechapel, London, and Toynbee Hall became the first University Extention Settlement leading to public playgrounds, parks, municipal theaters, free concerts, boys' and girls' clubs, and social centers. In 1888, Oxford House, at Bethnal Green, another London slum center, was opened for social and intellectual improvement. From these have arisen our Neighborhood Guilds and College Settlements. Hull House, Chicago, was one of the first, and has done such magnificent work since 1889 that it has actually reduced the rate of mortality in its section of the city. These Guilds and Settlements now number over 100 in the United States. The branch of 'hospital service' has been recently added to social work and is giving evidence of great usefulness.

Professional Workers. The great expansion of social work has lately become so complex that it requires leaders who have made critical studies of the needs of the people, conditions of work, and housing accommodation. This has led to the establishment of paid workers efficient in this branch of applied sociology, and able to train others in the city's centers. The National Conference of Social Work came into being in 1873, and was fully organized in 1879, with headquarters in Cincinnati; it entered on its 49th conference at Providence, R. I., in 1922. In order to avoid duplication of service

in the ever multiplying and overlapping branches, a Conference of the Coördination of National Social Work was held in Washington, D. C., in 1921. The conference assumed such significance that some Federal departments sent representatives.

Among the numerous associations are the American National Red Cross (1881), Washington, D. C. (which instructs in 'home hygiene and care of sick'); National Conference of Jewish Social Service (1899), New York; American Association for Organizing Family Social Work (1911), New York; National Children's Home and Welfare Association (1912), New York; American Association of Hospital Social Workers (1918), Washington, D. C.; Foreign Language Information Service (1918), Washington, D. C.; National Information Bureau (1918), New York; American Association of Community Organizations (1918), Louisville, Ky.; American Association of Social Service Exchanges (1919), Philadelphia, etc. A fairly comprehensive directory, together with definition of aims, of the many social workers' associations is to be found in Hendrick's *Handbook of Social Resources in the United States*, published by the American Red Cross. The world-wide activities of the Salvation Army and its outgrowth, the Volunteers, scarcely need mention as to their work among the 'submerged' population (General Booth used the term 'gutter'). One of the most significant recent extensions of the movement is its participation by such States as Missouri, Arizona, Connecticut, Delaware, South Dakota, Wisconsin, Michigan, by inaugurating social welfare boards under State legislation (mostly with regard to children's welfare).

Factory Welfare. The movement (subsidiary to the Social Work) aiming at the betterment of the industrial classes working in the factories is now generally named under the above title. Early in the development of this social service the employers learned from experience that they, as well as the employees, reaped considerable advantage. And their mutual action has done much to 'humanize industry.' 'Raising the workman's standard of life' is the expression used as definition of 'factory welfare.' Progress of this branch of social work has grown to such dimensions that the systems have (like the other branches) had to call in the services of paid experts—the 'welfare secretary' has come into being and it is his duty to attend to such matters as heating, ventilation, cleanliness, lavatories, lockers, lunch and rest rooms, hospital treatment, and so forth, not to mention convalescent homes, holiday homes, co-operative social and recreation clubs, baths and gymnasiums. With the growth of 'big business' the office workers' staffs have grown to very large proportions, and the welfare movement has taken hold in most of the offices of great commercial establishments, social welfare workers efficiently attending to the mental and physical needs of the clerical members.

Society Islands, an important group of islands of the South Pacific, between the Low Islands on the east and the Friendly Islands on the west. The group consists of the principal island of Tahiti or Otaheite—which is about 32 miles long, and is divided into two peninsulas by an isthmus about 3 miles broad; area, 600 square miles—and a number of comparatively small islands, Moorea, Raiatea, Huahine, etc., all now belonging to France. All the islands are elevated, and more or less mountainous. In Tahiti, which consists of an elongated ridge, the loftiest summit, Orohena, is over 7000 feet above the sea. Cotton, copra, coffee, sugar, pearl and mother-of-pearl are exported. The Society Islands were first discovered in 1606 by Pedro Fernandez di Quiros. Captain Cook visited the island in 1769 and later. The islands were annexed by France in 1880. Pop. estimated at about 18,500.

Socinians. See *Socinus* and *Unitarians.*

Socinus (so-sī'nus), the Latinized name of two celebrated theologians, uncle and nephew, who have given their name to a religious sect, the Socinians, whose modified doctrines are now known as Unitarianism.—Laelius Socinus (Lello Sozzini), born in 1525 at Siena, in Tuscany, and destined for the legal profession, abandoned jurisprudence for the study of the Scriptures. In 1546 he was admitted a member of a secret society at Vicenza, formed for the discussion of religious questions, which arrived at the conclusion that the doctrine of the Trinity was untenable. He visited France, England, Holland, etc., and resided for some time in Poland, where he found many persons who were in sympathy with his views. Died 1562. —Faustus Socinus (Fausto Sozzini), a nephew of the preceding, born at Siena in 1539, was obliged to leave that town in his twentieth year on account of his heretical notions. On the death of his uncle he came into possession of the manuscripts of the latter, by the study of which he found his former

opinions confirmed. He began to publish his views at Florence (where he lived twelve years at the court of the grand-duke, Francesco de' Medici) in anonymous writings, but afterwards retired to Basel to escape the Inquisition. His opinions were still more fully developed during a residence in Transylvania, and in Poland he had numerous adherents. His death took place in 1604. See *Unitarians.*

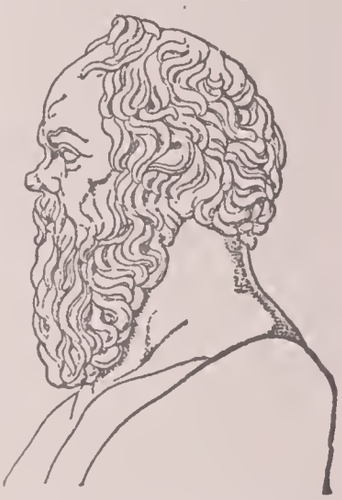
Sociology (sō-shi-ol'ō-ji), the science which investigates the laws of forces which regulate human society in all its grades, existing and historical, savage and civilized; or the science which treats of the general structure of society, the laws of its development, and the progress of actual civilization. Comte was the first to treat the subject from a scientific point of view. He was followed by Quetelet and Herbert Spencer. See Comte's *Traité de Sociologie* and Spencer's *Study of Sociology* (1874), and *Principles of Sociology* (1876).

Sock (Lat. *soccus*), a low shoe or slipper, worn by the Greeks, and also by the Roman women, who had them highly ornamented. They were likewise worn by comic actors, the buskin, or cothurnus, being used in tragedy; hence sock and buskin are used figuratively as equivalent to comedy and tragedy.

Socorro (sō-kor'rō), a town of the Republic of Colombia, in a very hot and unhealthy district, 150 miles N. N. E. of Bogotá. It has manufactures of cotton goods and straw hats, and a considerable trade with the surrounding districts. Pop. about 20,000.

Socotra (sō-kō'trà), an island in the Indian Ocean, about 150 miles E. N. E. of Cape Guardafui, 71 miles long by 22 miles broad. Aloes, tamarinds, and dates are the chief productions. Cattle, sheep, goats, and asses are plentiful, and the climate is hot and dry, but the valleys are well watered and fertile. The inhabitants are chiefly a mixed race of Arabs, Indians, Africans, and Portuguese. The island was annexed by Britain in 1886. Pop. about 12,000.

Socrates (sok'ra-tēz), an ancient Greek philosopher, born at Athens in or about 469 B.C. His father, Sophroniscus, was a sculptor, and Socrates himself for a time followed this occupation. He served as a common soldier in the campaign of Potidæa (432-429 B.C.), fought at the battle of Delium (424), and in 422 he marched with Cleon against Amphipolis. In these campaigns his bravery and endurance were conspicuous; and he was the means of saving the lives of Alcibiades and Xenophon. After the naval battle of Arginusæ (406) against the Spartans, ten Athenian officers were arraigned for neglecting the sacred duty of burying the slain. The clamor for their condemnation rose so high that the court wished to proceed in violation of all legal forms; but Socrates, the presiding judge at the trial, refused to put the question. Soon after he was summoned by the tyrannical government of the Thirty to proceed with four other persons to Salamis to bring back an Athenian citizen who had retired thither to escape the rapacity of the new government. Socrates alone refused. After this he declined to take any further share in public affairs, giving as a reason the warnings of an internal voice of which he was wont to speak. Following the promptings of this divine mentor he trained himself to coarse fare, scanty clothing, and indifference to heat or cold, and brought into thorough subjection his naturally impetuous passions. But though a sage, he was wholly removed from the gloom and constraint of asceticism; he indeed exemplified the finest Athenian social culture, was a witty as well as a serious disputant, and did not refrain from festive enjoyment. Of his wife Xanthippe, all that has passed into history is that she bore him three sons, and that she was an arrant shrew. Socrates wrote nothing, and neither sought to found a school nor a system of philosophy. His plan was to mix with men freely in any place of public resort, when he questioned and suggested the right path to real knowledge. Ignorance and pretense could not be hidden when his cross-examination came to bear on them, and he thus created many enemies. Aristophanes attacked him violently in his comedy of *The Clouds* as a sophist, an enemy of religion, and a corrupter of youth. But he had many distinguished friends, such as Plato, Xenophon, Euclid of Megara, Antisthenes, Aristippus, Æschines, and Alcibiades. In 399 B.C. a formal accusation was brought against him by Anytus,



Socrates, from ancient bust.

a leading demagogue; Meletus, a tragic poet, and Lycon, an orator, charging him with not believing in the gods which the state worshiped, with introducing new divinities, and with corrupting youth. The trial took place before a law-court composed of citizen judges. His bold defense is preserved by Plato, under the title of the *Apology of Socrates*. He dwelt on his mission to convict men of their ignorance for their ultimate benefit; declared himself a public blessing to the Athenians; assuring them if his life were spared he would continue in the same course; and regarded the approach of death with utter indifference. He was condemned to death by a majority of his judges; refused help to escape, and thirty days after his sentence drank the hemlock cup with composure, and died in his 70th year (B.C. 399). The account of his last hours is given in full detail in the *Phædo* of Plato. In their accounts of the life of Socrates the two principal authorities, Xenophon and Plato, substantially agree. It should be borne in mind, however, that Plato in his *Dialogues* generally presents his own thoughts through the mouth of Socrates, and that it is often difficult to discriminate between the Platonic and Socratic elements. While the previous philosophies consisted of vague speculations on nature as a whole, combining cosmology, astronomy, geography, physics, metaphysics, etc., Socrates arrived at the conclusion that the knowledge he had gained was of little practical value; and the speculations of philosophers, from Thales downwards, as to the origin of all things out of fire, water, air, etc., he regarded as profitless. Men's strivings after knowledge, he opined, should be directed to the human relationships as involving men's practical concerns. Self-knowledge is the condition of practical excellence. He introduced no formal system of ethics and no reasoned system of dialectics, but he paved the way for other philosophers to take up these subjects and work them out; and thus his teaching was the precursor of Platonism and the Aristotelian logic, and of all the often conflicting systems which rose into more or less importance for ten successive centuries.

Soda (sō′da), a term applied, in common language, to two or more substances — protoxide of sodium (Na_2O), hydroxide of sodium (NaHO), and carbonate of sodium (Na_2CO_3) being known under the name of soda. In scientific language, however, the name is only given to the protoxide of sodium (Na_2O), the hydroxide being frequently called *caustic soda*. The protoxide of sodium is formed when sodium is burned in dry air or oxygen. It is a white powder, which attracts moisture and carbonic acid from the air. When this protoxide is dissolved in water there is formed the true alkali or hydrate of sodium, called also caustic alkali (NaHO), which is a white brittle mass of a fibrous texture, having a specific gravity of 2.13. Caustic soda has a most corrosive taste and action upon animal substances; it dissolves readily both in water and alcohol; in the solid form it readily attracts water and carbonic acid from the atmosphere, the final product being an efflorescent carbonate. It forms soaps when boiled with tallow, oils, wax, rosin; dissolves wool, hair, silk, horn, alumina, silica, sulphur, and some metallic sulphides. With acids soda forms salts which are soluble in water, and many of which crystallize. The carbonate of soda ($Na_2CO_3 10\,H_2O$) is the soda of commerce in various states, either crystallized in lumps or in a crude powder called *soda-ash*. It is obtained from the ash of plants growing near the sea, from native sources, or by chemical processes. The soda obtained from plants contains from 3 to 30 per cent. of carbonate. It is imported from Spain under the name of *barilla*, from France as *silicar* or *blanquette*, and from Normandy and Brittany as *varec*. Native soda is obtained in great part from the mineral waters of Karlsbad, Aix, Vichy, and the geysers of Iceland; from the Caspian and Black Sea, from California and Virginia. But the amount of soda derived from these sources is as nothing compared with that manufactured every year by chemical processes. In these the first process is the decomposition of common salt (chloride of sodium) by means of sulphuric acid; the second, the conversion of the sulphate of sodium so produced into crude carbonate of soda by strongly heating with chalk and carbonaceous matter; third, the purification of this crude carbonate, either into a dry white soda-ash or into crystals; and, fourth, the treatment of the by-products — hydrochloric acid and calcium sulphide. The chief uses of soda are in the manufacture of glass and of hard soap. The carbonate of soda is used in washing, and is a powerful detergent. It is also used in medicine. Sulphate of soda is Glauber's salt (which see).

Soda-water, an effervescing drink generally consisting of ordinary water into which carbonic acid

has been forced under pressure. It rarely contains soda in any form. It is usually flavored with fruit or other syrups before being drunk.

Sodium (sō'di-um), the metal of which soda is the oxide; symbol Na (from *Natrium*), atomic weight 23. It was discovered by Sir Humphry Davy in the year 1807. Previously the oxide of the metal, soda, was looked on as an elementary body, but Davy succeeded in breaking it up, by the action of electricity, into oxygen and a new metal. Gay-Lussac and Thénard soon afterwards procured it in greater quantity by decomposing soda by means of iron; and Brunner showed that it may be prepared with much greater facility by distilling a mixture of carbonate of soda with charcoal; it is now prepared by the latter process in considerable quantities. Sodium is a silver-white metal, having a very high luster. Its specific gravity is 0.972; it melts at 204° Fahr., and oxidizes rapidly in the air, though not so rapidly as potassium. It decomposes water instantly, but does not spontaneously take fire when thrown on water, unless the water be somewhat warm, or the progress of the globule of sodium upon the surface of the water be impeded. When heated in air or oxygen it takes fire and burns with a very pure and intense yellow flame. It is perhaps more abundant in our globe than any other metal, for it constitutes two-fifths of all the sea-salt existing in sea-water, in the water of springs, rivers, and lakes, in almost all soils, and in the form of rock-salt. It is used as an agent in the manufacture of aluminum and magnesium, and as a reagent in chemical operations. Common salt is a compound of chlorine with sodium. Sodium also occurs as oxide of sodium or soda in a good many minerals; and more especially in the form of carbonate, nitrate, and borate of soda. Sodium is contained in sea plants, and in land plants growing near the sea. It occurs also in most animal fluids. The only important oxide of sodium is the protoxide, known as soda. See *Soda*.

Sodom (sod'um), the principal of the five cities (Sodom, Gomorrah, Admah, Zeboïm and Zoar) described in the book of Genesis as the cities of the plain (*i.e.*, of Jordan). They were overthrown on account of the wickedness of the inhabitants, being destroyed by a rain of fire and brimstone (Gen. xix.), with the exception of Zoar, which was spared at the supplication of Lot. Modern writers are not agreed as to the site of these cities.

Sodom, APPLE OF, a fruit mentioned by early writers as growing on the shore of the Dead Sea, which was beautiful to the eye, but when eaten filled the mouth with ashes; supposed to have been a gall produced on dwarf oaks by an insect, or the fruit of a species of *Solānum*.

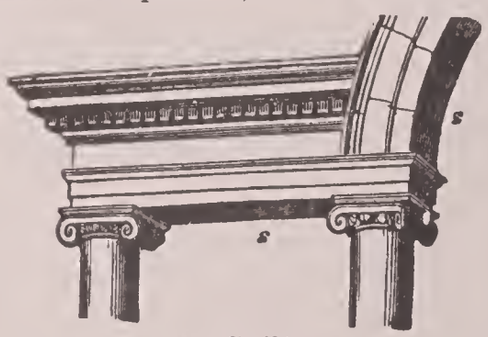
Sodo'ma. See *Razzi*.

Soerabaya (sö-rå-bä'yå). See *Sourabaya*.

Soest (sōst), an ancient town of Prussia, in the province of Westphalia, with dark winding streets, several interesting churches, including a Byzantine cathedral and a fine pointed Gothic church. It has puddling works and rolling-mills, tanneries, breweries, distilleries, soap-works, etc. Pop. 17,394.

Sofala (sō-få'lå), a town or village belonging to the Portuguese since 1505, on the southeast coast of Africa, on the Mozambique Channel, a miserable assemblage of mud huts. Pop. about 1300.— The same name is given to the district lying on the coast between the mouths of the Zambesi on the north and Delagoa Bay on the south, and extending inland for about 150 miles. It belongs to the Portuguese province of Mozambique.

Soffit (sof'it), in architecture, any ceiling divided into square compartments or panels; also the lower surface of an architrave, an arch, a balcony, a cornice, etc.



s s, Soffits.

Sofia (sō'fē-yå), SO'PHIA, the capital of the principality of Bulgaria, situated in a plain on the river Bogana, near the foot of the north side of the Balkan Mountains, 310 miles W. N. W. of Constantinople. It consists for the most part of mean houses and narrow dirty streets; is the see of a Greek archbishop and a Catholic bishop; and has several mosques, very extensive bazaars, and a considerable trade, chiefly in the hands of Greeks and Armenians. Sofia was built by the Emperor Justinian on the ruins of the ancient Sardica. Pop. (1910) 102,812.

Sofism. See *Sufism*.

Softa, (sof'ta), in Turkey, a person withdrawn from the world and devoted to the study of Mohammedan law and religion; mostly a bigot opposed to all reforms.

Soft-grass. See *Holcus*.

Sogdiana (sog-di-ā'na), anciently the most northern province of the Persian empire, reaching to the Jaxartes.

Sognefjord (sog'nā-fe-ord), an extensive fjord on the west coast of Norway penetrating the country to a distance of 136 miles. It is noted for its gold rock and glacier scenery.

Sohar (sō-här'), an important seaport of S. E. Arabia, on the coast of Oman. It is noted for its gold and silver manufactures. Pop. about 5000.

Soignies (swån-yē), a town of Belgium, in the province of Hainault, with regular streets and well-built houses; Romanesque church of the twelfth century, and a town-hall in the Spanish style. Pop. 10,480.

Soil, mold, or that compound earthy substance which furnishes nutriment to plants, or which is particularly adapted to support and nourish them. Wherever the surface of the earth is not covered with water, or is not naked rock, there is a layer of earth more or less mixed with the remains of animal and vegetable substances in a state of decomposition, which is commonly called the *soil*. In uncultivated grounds soils generally occupy only a few inches in depth on the surface; in cultivated grounds their depth is generally the same as that to which the implements used in cultivation have penetrated. The stratum which lies immediately under the soil is called the subsoil, which is comparatively without organized matter. Soil is composed of certain mixtures or combinations of the following substances: the earths, silica, alumina, lime, magnesia; the alkalies, potassa, soda, and ammonia; oxide of iron and small portions of other metallic oxides; a considerable proportion of moisture, and several gases, as oxygen, hydrogen, carbonic acid. Besides these every soil contains vegetable and animal matters, either partially or wholly decomposed. See *Agriculture, Manures*.

Soiling (soil'ing), in agriculture, the practice of supporting animals in the summer season with green food of different sorts, cut daily, and given to them in racks in the stalls or yards, instead of sending them to the fields.

Soissons (swå-sōn), a city of France, in the department of the Aisne, and on the river Aisne, 51 miles northeast of Paris. It is a fortress of the second rank. In the great war of 1914-18 the town fell into the hands of the Germans, but was retaken by a combined Franco-American attack on August 2, 1918. It was the culminating point in a series of counter-assaults delivered by Marshal Foch upon the German troops between Rheims and Soissons, which destroyed the great salient stretching to the Marne and drove the Germans back to the Vesle (see *European War*). The old town of Soissons held many interesting relics, including a cathedral begun in the twelfth century and the remains of an abbey. The population in 1914 was 14,460.

Sokoto (sō'kō-tō), or SACK'ATOO, a large town in Central Africa, on the Sokoto or Rima, which falls into the Niger. It is surrounded by lofty walls, is fairly well built, and has regular streets, a royal residence, several mosques, manufactures of cotton cloth, and carries on an extensive trade. Pop. given at about 10,000.— The same name belongs to an extensive Fellata kingdom, of which the town was formerly the capital, though Wurno has now that rank; area, about 170,000 sq. miles. Pop. estimated at about 10,000,000. The country is now being opened up to British trade.

Solanaceæ (sol-a-nā'se-ē), a nat. order of monopetalous exogenous plants, composed of herbs or shrubs, natives of most parts of the world, and especially within the tropics. They have alternate leaves, terminal or axillary inflorescence, and regular, or nearly regular, monopetalous flowers. The nightshade, potato, capsicum, tomato, egg-plant, and tobacco, are all of this order, the typical genus being *Solānum*, which contains the potato, nightshade, egg-plant, and numerous other species. The general property of the order is narcotic and poisonous. This prevails to a greater or less degree in all the members, although certain parts of the plants, when cultivated, are used for food.

Solander (so-lan'der), DANIEL CHARLES, a Swedish botanist, born in 1736, studied under Linnæus, settled in England in 1760, became connected with the British Museum, accompanied Sir Joseph Banks in Cook's first voyage round the world in 1768-71, and died in 1782.

Solan Goose. See *Gannet.*

Solanine (sol'a-nīn; $C_{21}H_{35}NO_7$), a vegetable alkaloid obtained from various species of Solanum, as *S. Dulcamāra, S. nigrum, S. tuberosum,* etc. It forms a crystalline powder, very bitter and acrid, and highly poisonous. It is insoluble in water, but soluble in alcohol. With acids it forms salts which are uncrystallizable.

Solar Corona. See *Corona.*

Solar Cycle, in chronology, a term applied to one of those artificial periods made use of in chronological researches. It comprehends a period of 28 years, compounded of 7 and 4, the number of days in a week, and the number of years in the interval of two leap years. This cycle remained undisturbed till the end of the nineteenth century; but in consequence of the year 1900 not being reckoned as a leap year, the whole cycle was thereby overthrown.

Solar Day. See *Day.*

Solar Engine, an apparatus for utilizing the heat of the sun as a motive power, by causing it, through the medium of a reflecting metallic mirror, to heat the water in a small boiler and convert it into steam. Various efforts have been made to produce a satisfactory engine of this kind, a successful one being constructed at Pasadena, California, in 1901. In this a large mirror was built up of small pieces of glass, accurately adjusted. The mechanism was made to turn automatically, following the sun's motion, and yielded heat enough to operate a 10 horse-power pumping engine. The reflector was a zone 33½ feet in larger, and 15 in smaller diameter, being made up of 1788 small mirrors. Improvements have recently been made in these machines and large hopes are entertained concerning them.

Solar Microscope, an instrument by means of which a magnified image of a small transparent object is projected on a screen, the light employed being sunlight. It is really a magic lantern, in which the microscopic object is affixed to a clear glass plate, and the light employed bright sunlight reflected into the instrument.

Solar Plexus, in anatomy, a nervous center at the upper part of the abdomen behind the stomach and in front of the aorta and the pillars of the diaphragm. It is the largest of the pre-vertebral centers. Called also the epigastric plexus.

Solar Prominences, red flame-like masses seen in the atmosphere of the sun at a total solar eclipse. See *Sun.*

Solar System, in astronomy, that system of which the sun is the center. To this system belong the planets, planetoids, satellites, comets, and meteorites, which all directly or indirectly revolve round the sun, the whole being bound together by the mutual attractions of the several parts. See *Astronomy, Planets, Sun, Moon, Gravitation,* etc

Solar Time, time as indicated by a sun-dial. The successive hours so indicated are not equal intervals of time. See *Day, Equation of Time.*

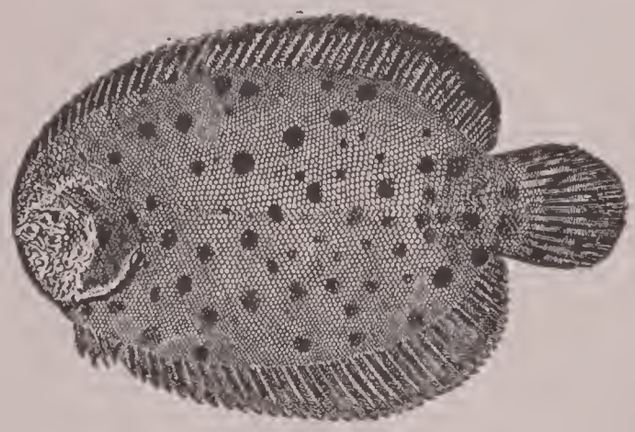
Soldanella (sol-da-nel'a), a genus of plants, nat. order Primulaceæ. The species are small herbs of graceful habit, natives of alpine districts of Continental Europe. One of them, *S. alpina,* a native of Switzerland, with lovely blue flowers, is well known as an object of culture.

Solder (sod'er, sol'der), a metallic cement, consisting of simple or mixed metals, by which ordinarily metallic bodies are firmly united with each other. It is a general rule that the solder should always be easier of fusion than the metal intended to be soldered by it. The usual solders are compound, and are divided into hard and soft. The hard solders are ductile, will bear hammering, and are commonly prepared of the same metal with that which is to be soldered, with the addition of some other, by which a greater degree of fusibility is obtained. Under this head comes the hard solder for gold, which is prepared from gold and silver, or gold and copper, or gold, silver, and copper. The hard solder for silver is prepared from equal parts of silver and brass, but made easier of fusion by the admixture of one-sixteenth of zinc. The hard solder for brass is obtained from brass mixed with a sixth, or an eighth, or even one-half of zinc, which may also be used for the hard solder of copper. The soft solders melt easily, but are partly brittle, and therefore cannot be hammered. Of this kind are the following mixtures: tin and lead in equal parts; bismuth, tin, and lead in equal parts; one or two parts of bismuth, of tin and lead each one part. In soldering, the surfaces to be united must be made perfectly clean and free from oxide. This is commonly effected by scraping the surfaces; and in order that the formation of any oxide may be prevented during the process

borax, sal ammoniac, or rosin is used, either mixed with the solder, or applied to the surfaces.— *Autogenous soldering* is the union of two pieces of metal without the intervention of any solder, by fusing them at the point of junction by jets of flame from a gas blow-pipe or by other means.

Soldiers' Insurance. See *Insurance.*

Sole (sōl; *Solĕa vulgāris*), a marine fish belonging to the Pleuronectidæ or flat-fishes, of an oblong or oval form. These fish abound on all the coasts of Europe except the most northern, where the bottom is sandy. They furnish a wholesome and delicious article of food. They sometimes ascend rivers, and seem to thrive quite well in



American Sole.
Under side of Achirus Lineatus.

fresh water. The sole sometimes grows to the weight of 6 or 7 lbs. The name is also given in America to certain other flat-fishes. The sole is at its worst from February to the end of March, this being the spawning season. It is usually captured by the trawl-net.

Solemn League and Covenant. See *Covenant.*

Solen (sō'len). See *Razor-shell.*

Solenhofen (sō'len-hō-fen), or SOLNHOFEN, a village of Bavaria, near Eichstadt, noted for its famous deposit of limestone of the Upper Oölite age, which, from its fine grain and homogeneous texture, is admirably adapted for lithographic purposes.

Solenoid (sō'len-oid), a simple form of electro-magnet, made use of in electrical experiments. A helix of stout copper wire has the ends of the wire turned in so as to pass along the axis of the helix to the middle, where they are brought out between two of the turns and attached to the terminals of a battery. The different parts of the helix are insulated from each other. While the current passes the solenoid acts in every respect like an ordinary magnet.

Solent (sō'lent), that part of the British Channel separating the northwest shore of the Isle of Wight from the mainland of Hampshire, and extending between the Needles and West Cowes. It has a width varying from 2 to 5 miles, and affords a safe and well-sheltered roadstead.

Solesmes (so-lām), a town of France, department of the Nord, arrondissement of Cambrai, with manufactures of sugar, etc. Pop. 6081.

Soleure (so-leur; German, *Solothurn*), a canton of Switzerland, bounded on the north by Basel-Land; west, south, and southeast by Bern; and east by Aargau; area, 306 square miles. It is traversed throughout by the Jura. The whole canton belongs to the basin of the Rhine, which receives the greater part of its drainage through the Aar. The climate is on the whole remarkably temperate, and not only in the lower grounds but on many of the mountain-slopes nearly all the ordinary cereals and large quantities of fruit are raised. Immense numbers of cattle, both for feeding and dairy purposes, thrive in the meadows and pastures. Limestone is extensively quarried; and when susceptible of high polish or variegated it is called Soleure marble. The inhabitants are mostly Roman Catholic and speak German. Education is compulsory. Pop. 100,762.— SOLEURE, the capital, is situated on the south side of the Jura chain, on both sides of the Aar. It is well built; has a cathedral, built in 1762-73; a clock-tower, of Burgundian origin (fifth to sixth century); town-house; arsenal, with collection of ancient armor, etc. Pop. 10,030.

Sol-fa System. See *Tonic Sol-fa System.*

Solfatara (sol-fa-tâ'ra), the Italian name for volcanic vents found in various parts, which give out sulphurous gases and vapors.

Solfeggio (sol-fej'ō). See *Solmization.*

Solferino (sol-fe-rē'nō), a village and commune of Italy, in the province and 18 miles northwest of Mantua. In 1796 the Austrians were here defeated by the French prior to the siege of Mantua; it was here also, on June 24, 1859, that a battle was fought between the French and Sardinians on the one side and the Austrians on the

other, resulting in the defeat of the latter, and the subsequent treaty of Villafranca. Pop. 1350.

Solicitor (so-lis'i-tur), a legal practitioner whose business it is to commence, carry on, or defend suits at law on behalf of persons who employ him, and who usually also carries on conveyancing and other non-contentious business. In England the term was formerly applied distinctively to agents practicing before the courts of chancery, attorneys being those who practiced in the courts of common law; but by the Judicature Act of 1873 all persons practicing before the supreme courts are now called solicitors, and the term attorney is practically obsolete. In the United States a solicitor is a person employed to follow and take charge of suits depending in courts of chancery. A solicitor, like an attorney, will be required to act with perfect good faith toward his clients. See *Barrister.*

Solicitor-general, an officer of the British crown, next in rank to the attorney-general, with whom he is in fact associated in the management of the legal business of the crown, and public offices The solicitor-general of Scotland is one of the crown-counsel, next in dignity and importance to the lord-advocate.

Solidago. See *Golden-rod.*

Solidification (so-lid-i-fi-kā'shun), the passage of a body into the solid state. A body, on solidifying from the liquid state, gives up a quantity of heat without exhibiting a decrease of temperature. Two laws are recognized in the solidifying of bodies from a state of fusion: — (1.) *A substance begins to solidify at a temperature which is fixed if the pressure is fixed; at ordinary atmospheric pressure this temperature is the temperature or point of fusion for the particular substance.* (2.) *From the moment solidification commences till it is completed the temperature of the liquid portion is constant.* There are some substances, such as glass and iron, which become plastic before liquefying, and therefore possess no definite point of fusion; and for such substances the above laws do not hold. Solidification is called *crystallization* when crystals which may be seen are formed. When water solidifies the resulting ice is about $\frac{1}{11}$ larger than the volume of water which produced it, and on this account ice floats on the surface. Cast-iron is larger, at the temperature of the fusing-point, in the solid than in the liquid state; so also is bronze and other metals which give good sharp castings. In many cases, however, a substance contracts in the act of solidifying.

Solidungula (sol-i-dung'gū-la; 'Single-hoofed'), a division of the mammalian order Ungulata, containing the horse, ass, etc.

Solidus (sol'i-dus), a Roman coin originally called aureus. See *Aureus.*

Soliman' II. See *Solyman II.*

Solingen (zō'ling-en), a town of Prussia, in the Rhine province, with manufactures of iron and steel ware, especially swords; copper and brass ware, cutlery, surgical instruments, etc Pop., including Dorp, 49,018.

Solis (sō'lēs), ANTONIO DE, a Spanish poet and historian, born at Placenza, in Old Castile, in 1610. He is principally known as an historical writer. Having been appointed historiographer of the Indies, he drew up a work entitled *Historia de la Conquista de Mejico*, which passed through many editions, and of which an English translation was published in 1724. He died in 1686.

Solitaire (sol'i-tār), a bird belonging to the dodo family, but having a smaller bill and shorter legs. *Pezophaps solitarius*, the only species of whose existence there is any evidence, is now, like the dodo, extinct, and became so since 1691, when the island of Rodriguez, situated about 300 miles to the east of the Mauritius, where alone it was found, was first inhabited.

Solitaire, a game played by one person on a board indented with thirty-three or thirty-seven hemispherical hollows, with an equal number of balls. One ball is removed from the board, and the empty hollow thus left enables pieces to be captured singly as in draughts. All the pieces but one must be taken without moving over more than two spaces at a time. Also card games played by one person. Of these there are a large number, played with one or more packs.

Solmization (sol-mi-zā'shun), in music, an exercise for acquiring the true intonation of the notes of the scale, first by singing them in regular gradation upwards and downwards, and then by skips over shorter or longer intervals. To facilitate this various expedients have been devised, the most popular being the association of the several sounds with certain syllables, such as *ut, re, mi, fa, sol, la*, said to have been first used by Guido of Arezzo in the eleventh century — an additional syllable, *si*, for the seventh of the scale, being

introduced at a much later date. In the tonic sol-fa method these syllables are thus modified — *doh, ray, me, fah, soh, lah, te.* See *Tonic Sol-fa.*

Solo (sō'lō), a tune, air, or strain to be played by a single instrument or sung by a single voice without or with an accompaniment, which should always be strictly subordinate.

Solomon (sol'a-mun; *Hebrew, Shel-ōmōh,* the Prince of Peace), son of David, king of Israel, by Bath-sheba, formerly the wife of Uriah, was appointed by David to be his successor in preference to his elder brothers. By his remarkable judicial decisions, and his completion of the political institutions of David, Solomon gained the respect and admiration of his people; while by the building of the temple, which gave to the Hebrew worship a magnificence it had not hitherto possessed, he bound the nation still more strongly to his throne. The wealth of Solomon — accumulated by a prudent use of the treasures inherited from his father, by successful commerce, by a careful administration of the royal revenues, and by an increase of taxes — enabled him to meet the expense of erecting the temple, building palaces, cities, and fortifications, and of supporting the extravagance of a luxurious court. Fortune long seemed to favor this great king; and Israel, in the fullness of its prosperity, scarcely perceived that he was continually becoming more despotic. Contrary to the laws of Moses, he admitted foreign women into his harem; and from love of them he was weak enough in his old age to permit the free practice of their idolatrous worship, and even to take part in it himself. Towards the close of his reign troubles arose in consequence of these delinquencies, and the growing discontent, coming to a head after his death, resulted in the division of the kingdom, which his feeble son Rehoboam could not prevent. The forty years' reign of Solomon is still celebrated among the Jews, for its splendor and its happy tranquillity, as one of the brightest periods of their history. The writings attributed to Solomon are the *Book of Proverbs, Ecclesiastes,* and the *Song of Solomon,* with the apocryphal book the *Wisdom of Solomon;* but modern criticism has decided that only a portion of the *Book of Proverbs* can be referred to Solomon.

Solomon Islands, (1) a chain of islands in the Western Pacific, east of New Guinea, and between New Britain and New Hebrides. The natives, still in a savage state and cannibals, are partly of Malay and partly of Negrito blood. In consequence of an agreement entered into between the British and German governments in 1885, the northern part of the group is within the German sphere of influence; the southern under the British Western Pacific Protectorate. (2) A group of small islands with no permanent inhabitants, in the Indian Ocean, dependencies of Mauritius.

Solomon's Seal, the common name of plants of the genus *Polygonātum,* a genus of liliaceous but not bulbous plants, with axillary cylindrical six-cleft flowers, the stamens inserted in the top of the tube, and the fruit a globose three-celled berry. Species

Solomon's Seal (*Polygonatum vulgare*).

are found throughout Europe, and there are two species in the United States, one (*P. giganteum*) of large size.

Solomon's Song (called also the SONG OF SONGS, or CANTICLES), one of the canonical books of the Old Testament. From the earliest period this book has been the subject of voluminous controversies. It seems to have been a recognized part of the Jewish canon in the time of Jesus. Till the beginning of the last century the author of the book was almost universally believed to be Solomon. Modern critics, however, attribute it to an author of Northern Israel, who wrote it about the middle of the tenth century B.C., shortly after the death of Solomon, in a spirit of protest against the corrupt splendor of the court of Zion. The unity of the poem is sufficiently evidenced by the continuity of names, characters, and subject, and is taken for granted by the majority of critics. The main subject of dispute has been as to its interpretation. The various theories in regard thereto are too numerous to specify; but they naturally fall into two classes, the literal and allegorical. The highest form of allegorical significance contended for is

the mystical or spiritual interpretation, by which the whole poem becomes a figurative representation of the hopes and aspirations, together with the trials and difficulties, of a spiritual life. This interpretation, whether applied individually or collectively to the church or nation of Israel, was almost universally received both by Jews and Christians until recent times. The most favored literal interpretation is that originally given by Jacobi, that the poem represents the temptation and triumph of virtuous love. The supporters of the allegorical interpretation of the book strongly urge the frequency with which the marriage relation is employed, both in the Old and New Testament, to represent the relation of Jehovah to Israel in the old, and of Christ to the church in the new dispensation. Yet there seems to be nothing in the book itself to give warrant to this interpretation.

Solon (sō'lun), one of the seven wise men of Greece, and great legislator of Athens, born about B.C. 640. He was of good family, and acquired a wide knowledge of the world in commerce and travel. One of his earliest public transactions was in stirring the Athenians up to the recovery of Salamis, after which he was chosen chief archon (B.C. 594) and invested with unlimited powers, the state of parties in Athens being such as to threaten a revolution. He established a new constitution, divided the citizens according to their wealth, and added to the powers of the popular assembly. He made many laws relating to trade, commerce, etc. He either entirely abrogated all debts, or so reduced them that they were not burdensome to the debtors; and abolished the law which gave a creditor power to reduce his debtor to slavery. When he had completed his laws he bound the Athenians by oath not to make any changes in his code for ten years. He then left the country, to avoid being obliged to make any alterations in them, and visited Egypt, Cyprus, and other places. Returning after an absence of ten years, he found the state torn by the old party hate; but all parties agreed to submit their demands to his decision. It soon became evident, however, that Pisistratus would succeed in seizing the sovereignty, and Solon left Athens. Though Athens now fell under the despotic rule of Pisistratus, much of Solon's legislation remained effective. He is supposed to have died, in his eightieth year, about B.C. 558.

Solothurn (sol'o-turn), a canton of Switzerland. See *Soleure.*

Solstice (sol'stis), in astronomy, the point in the ecliptic at the greatest distance from the equator, at which the sun appears to stop or cease to recede from the equator, either north in summer or south in winter. There are two solstices — the summer solstice, the first degree of Cancer, where the sun is about the 21st of June; and the winter solstice, the first degree of Capricorn, where the sun is about the 22d of December. The time at which the sun is at either of these points also receives the same name.

Solution (so-lū'shun), the transformation of matter from either the solid or the gaseous state to the liquid state by means of a liquid called the *solvent*, or sometimes the *menstruum*. When a liquid adheres to a solid with sufficient force to overcome its cohesion, the solid is said to undergo solution, or to become dissolved. Thus sugar or salt are brought to a state of solution by water, camphor or resin by spirit of wine, silver or lead by mercury, and so on. Solution is facilitated by increasing the extent of surface in a solid, or by reducing it to powder. Heat also, by diminishing cohesion, favors solution; but there are exceptions to this rule, as in the case of lime and its salts, water just above the freezing point dissolving nearly twice as much lime as it does at the boiling point. If a solid body be introduced in successive small portions into a definite quantity of a liquid capable of dissolving it, the first portions disappear most rapidly, and each succeeding portion dissolves less rapidly than its predecessor, until solution altogether ceases. In such cases the forces of adhesion and cohesion balance each other, and the liquid is said to be *saturated.* Various solids dissolve in the same liquid at very different rates; thus baric sulphate may be said to be insoluble in water; calcic sulphate requires 700 parts of water for solution; potassic sulphate, 16; magnesic sulphate, 1.5. When water is saturated with one salt it will dissolve other salts without increase of bulk. It sometimes happens that the addition of a second solid will displace the first already in solution. It is probable that, in some cases there is chemical combination between the liquid and the dissolved substance.

Solvay, a village of Onondaga Co., New York, adjoining Syracuse, on State Barge Canal. Pop. 7352.

Solway Firth (sol'wā), an arm of the Irish Sea, forming part of the boundary between England and Scotland, and extending inland in a northeastern direction for above 41

miles, with a breadth diminishing from 20 miles, at its entrance between St. Bees Head in Cumberland, and Rayberry Head in Kirkcudbrightshire, to 7 miles, and finally only to 2 miles. A large portion of the Solway is left dry at ebb-tide. It abounds with fish, and has several valuable salmon fisheries.

Solway Moss, a tract of mossland, about 7 miles in circumference, in the N. of Cumberland, W. of Longtown; the scene of a battle between the English and the Scotch in 1542, when the latter were defeated.

Solyman (sol'i-man), or SULEIMAN II, surnamed the *Magnificent*, Sultan of Turkey, was the only son of Selim I, whom he succeeded in 1520. Having put down a revolt which occurred in Syria and Egypt, and concluded an armistice with Persia, he besieged and took Belgrade in 1521. The next year he captured the island of Rhodes, which had been in the possession of the Knights of St. John for 212 years. Turning his arms now against Hungary, he gained the battle of Mohács, and captured Buda and Pest. In 1529 he advanced on Vienna, but was forced to raise the siege with great loss. His armies next gained considerable territories from Persia. In 1541 he overran a great part of Hungary, but an armistice was concluded for five years in 1547, though war was renewed in 1551. In 1565 he attempted the capture of Malta in vain. Next year he died at the siege of Szigeth, in Hungary, in the seventy-sixth year of his age. See *Ottoman Empire.*

Soma (sō'ma), a plant belonging to the nat. order Asclepiadaceæ, the *Asclepias acida;* also an intoxicating drink obtained, it is supposed, from the plant, which the ancient Aryans believed was pleasing to the gods as a sacrifice. They went so far in their adoration of soma that they personified it as one of their highest gods.

Somaj. See *Brahmo-somaj.*

Somatic Life (sō-mat'ik), the name applied to the inherent vitality of the tissues and organs of the body, as distinguished from the more active sense in which the word 'life' is applied to that of the organism as a whole.

Somauli (sō-mä'lē), SOMALI LAND, a country on the eastern coast of Africa, bounded on the north by the Gulf of Aden; on the east by the Indian Ocean from Cape Guardafui to lat. 7° 45′ N. Its other boundaries are indefinite. Two ranges of mountains traverse the peninsula southeast to northwest, between which lies the Wadi Nogal, of which the natives speak in the most glowing terms. Several varieties of gum-trees occur, and the mimosa, tamarisk, wild fig, and several species of the cactus and aloe are abundant. The wild beasts include the elephant, lion, leopard, hyena, wolf, and jackal. Several varieties of deer, jerboas, and squirrels are common, Somaliland being one of the richest game sections of Africa. The Somâli are a fine race, mainly Mohammedans, though still in a barbarous state. The principal articles of trade or produce are myrrh, ivory, ostrich feathers, hides and horns, coffee, indigo, and gum-arabic. The northern section of the country, containing the ports of Berbera and Zeilah, is now held as British territory, while the eastern section is claimed by Italy. France claims a small northwestern section.

Sombrerete (sōm-brā-rā'tā), a small town of Mexico, about 80 miles northwest of Zacatecas, and in the province of that name, with rich mines of silver. Pop. 10,082.

Sombrero Island (som-brē'rō), a small rocky British island midway between Anguilla and the Virgin group, West Indies. It has a lighthouse, and large deposits of phosphate of lime.

Somers (sum'erz), JOHN, LORD, an English lawyer and statesman, born at Worcester in 1652, who took a prominent part in the opposition to the tyrannical measures of Charles II and James II, and acquired great credit for his share in the defense of the seven bishops. He was chairman of the committee which framed the Declaration of Rights, and sat in the Convention Parliament. After filling many legal offices, he became lord chancellor in 1689, with the title Lord Somers, Baron Evesham. Although so sturdy a Liberal, Lord Somers won the

Lord Somers.

esteem of many of the Tory party by his high character, his great ability, his consistency and courage, and his unfailing courtesy. After the death of William III he withdrew into retirement, but was recalled by Anne, who made him president of the council. He fell again with the Whigs in 1710. Science and letters found a warm patron in Lord Somers, who was one of the first to recognize Addison's ability. He died in 1716.

Somerset (sum'er-set), a county of England, bordering on the Bristol Channel; area, 1615 sq. miles. Part of the coast is low and marshy, and part lined with lofty slate cliffs. The interior is intersected by several ranges of hills, including the Mendip Hills, which in some parts exceed 1000 feet in height, and the Quantock Hills, occupying the west part of the county, attaining a height of 1270 feet. In the northeast the prevailing strata belong tothe Oölite formation, and contain the quarries which furnish the famous Bath stone. The chief minerals worked are lead, iron, and slate. The principal rivers are the Avon and Parret. Wheat and cattle of excellent quality are raised. The manufactures are mostly woolen and worsted goods, gloves, silk, linen, crape, and lace. Fisheries are carried on to some extent in the Bristol Channel. The county contains the cities of Bath and Wells, part of the city of Bristol, and the municipal boroughs of Bridgewater, Chard, Glastonbury, Taunton, and Yeovil. Pop. (1911) 458,074.

Somerset, Duke of. See *Seymour.*

Somerset, Robert Carr, Earl of, a favorite of James I, born in Scotland in 1589; died in 1640. He was at first a page to James, and followed him to England when he succeeded Elizabeth in 1603. The king became greatly attached to him, made him treasurer of Scotland, and gave him a seat in the upper house with the title of Viscount Rochester, and then of Earl of Somerset. In the height of his greatness he married the divorced wife (with whom he had previously had an improper intimacy) of the young Earl of Essex, contrary to the advice of his friend and secretary, Sir Thomas Overbury. The countess never forgave Overbury for this; and on her suggestion he was sent to the Tower for some trivial offense, and after a few months despatched by poison. The murder was discovered, and all the parties to it were condemned. The tools in the crime were executed, but Somerset and his wife were kept in the Tower. After a few years' imprisonment the unhappy pair obtained their freedom and spent the rest of their days in obscurity and disgrace.

Somerset House, Strand, London, stands on the site of a palace commenced by the Protector Somerset, and after being the residence of several royal personages, made way for the present buildings. It contains the offices of the registrar-general of births, deaths, and marriages, the exchequer and audit departments, etc.

Somersworth (sum'ẽrz-wurth), a city of Strafford county, New Hampshire, 5 miles N. of Dover. It has manufactures of cottons, yarns, woolens, etc. Pop. 6688.

Somers Islands. See *Bermudas.*

Somerville (sum'ẽr-vil), a city of Massachusetts, on the Mystic River, and a suburb of the city of Boston. It has extensive meat-packing establishments, office-furniture factory, jewelry works, tube works, and other industries. It contains some notable public and charitable institutions. Pop. (1910) (1910) 77,236; (1920) 93,033.

Somerville, Mary, writer on the physical sciences, born at Jedburgh, Scotland, in 1780; died at Naples in 1872. She was the daughter of Admiral Fairfax, and was to a great extent self-educated, but acquired a respectable knowledge of Greek and Latin. It was only, however, when she became acquainted with mathematics that she discovered the true bent of her genius, and in this study she made rapid progress. Married to Samuel Greig, consul for Russia, in 1804, she had only three years of wedded life, when her husband died. In 1812 she married her cousin, William Somerville. At the request of Lord Brougham, and with the object of popularizing Laplace's *Mécanique Céleste* for the Society for the Diffusion of Useful Knowledge, she, in 1827, prepared her first work, *Mechanism of the Heavens.* It proved above the class for whom it was intended, and was published independently in 1831. This work brought her many honors, including the honorary membership of the Royal Astronomical and other learned societies, and a pension from government. She wrote a preface to this work on the relation of the sciences, which was afterwards expanded into a separate work—*The Connection of the Physical Sciences* (1834). This work was translated into the principal European languages. Other works included a popular one on physical geography and one entitled *Molecular and Microscopic Science.*

Somerville, a residential borough, county seat of Somerset Co., New Jersey, on the Raritan River, 36 miles w. s. w. of New York. It has some manufactures. Pop. (1920) 6718.

Somerville, WILLIAM, an English poet, born in 1677, and educated at Oxford. His chief work, a didactic poem in blank verse, entitled *The Chase*, was published in 1735. He died in 1742.

Somme (sōm), a department of France, bounded on the northwest by the English Channel; area, 2443 square miles. The chief river is the Somme; the capital is Amiens. The department was formed mainly out of the old province of Picardy. Many battles were fought here during the European war which began in 1914. From June, 1916, to April, 1917, a well-planned Anglo-French campaign pushed back the German line, capturing town after town, including Bapaume and Peronne, with great losses to the enemy. The tide of war turned in the spring of 1918, and the German forces again swept over the fields of Picardy and menaced Amiens. The apparent plan was to drive the British toward the north and the French toward the south and reaching the mouth of the Somme separate the two armies. Foiled here they struck southward, but were stopped at Chateau Thierry by the Americans. Pop. 520,161.

Somnambulism (som-nam'bū-lizm), a peculiar perversion of the mental functions during sleep, in which the subject acts automatically. The organs of sense remain torpid and the intellectual powers are blunted. During this condition some instinctive excitation may take place, and there may be the production of impulses, in consequence, of different kinds. Walking in sleep is the most palpable, but not the most marvelous characteristic of this condition. The person affected may perform many voluntary actions implying to all appearance a certain degree of perception of the presence of external objects. The somnambulist gets out of bed, often dresses himself, goes out of doors, and walks frequently over very dangerous places in safety. On awaking maybe he is either utterly unconscious of having stirred during the night, or may remember it as a mere dream. Sometimes the strange proceedings of the somnambulist are carried much further; he will mount his horse and ride, or go to his usual occupation. In some cases somnambulists are capable of holding conversation. Somnambulism occurs in the sensitive and excitable, often in conjunction with other nervous affections, and is hereditary. Artificial somnambulism is induced by hypnotism, and the consciousness is for the time entirely absorbed by one set of ideas.

Somnath (som-nät'), a town of India, Bombay Presidency, Gujerat, on the coast of the Peninsula of Kattywar. It is in the form of an irregular quadrangle, inclosed on all sides except the west, where the sea washes it, by a ditch and a wall of great strength and solidity. The space inclosed is far too large for the present inhabitants, who live amid splendid ruins, telling of a grandeur which has long since passed away. The ruins of the great temple, to which the place was mainly indebted for its celebrity, stands on an eminence northwest of the town, and so completely overtops all the other buildings that it can be seen at the distance of 25 miles. Pop. 8341.

Somnus (som'nus; Latin, 'sleep'), or HYPNOS (Greek), in ancient mythology, the god of sleep, son of Nox (night) and twin brother of Mors (Death).

Sonata (so-nä'ta), in music, a term originally applied to any kind of composition for instruments, in contradistinction to vocal compositions, which were called *cantatas*. The name was subsequently, however, restricted to compositions for solo instruments (generally the pianoforte). Sonatas are of a certain form, consisting of several movements — at first three, the allegro, adagio, and rondo, to which afterwards a fourth was added, the minuetto or scherzo — which differ from each other in time and sentiment, but are held together by their general character.

Sonchus. See *Sow-thistle.*

Sonderburg (zōn'dėr-bör*h*), a town of Prussia, in Schleswig-Holstein, on the island of Alsen. Pop. (1905) 7047.

Sondershausen (zōn'dėrz-hou-sen), a town of Germany, the capital of Schwarzburg-Sondershausen, 34 miles N. N. W. of Weimar. It is walled, has four gates; a palace, with gardens, and a rich cabinet of natural history. Pop. (1905) 7383.

Sondrio (sōn'drē-ō), a town in North Italy, capital of the province of the same name, on the Mallero, near its junction with the Adda, at the south foot of the Rhætian Alps, with considerable trade, and some textile manufactures. Pop. 4425.— The province of Sondrio lies between the Grisons and the Tyrol, and has an area of 1257 square miles. Pop. 125,565.

Song, a little poem intended to be sung; a lyric. The term is applied to either a short poetical or musical composition, but most frequently to both in union. As a poetical composition a song may be defined as a short poem divided into portions of returning measure, and turning upon some single thought or feeling. As a union of poetry and music, it may be defined as a brief lyrical poem, founded commonly upon agreeable subjects, to which is added a melody for the purpose of singing it. As denoting a musical composition, it is generally confined to an air for a single voice — airs for more than one voice being, however, sometimes called part-songs.

Song-ka. See *Red River.*

Sonneberg (zōn'ne-ber*h*), a town of Germany, in the Duchy of Saxe-Meiningen, on the Röthen. Its chief industry is connected with the manufacture of toys, chiefly dolls, of wood or papier-maché, which go to all parts of the world, but especially to Britain and America. Pop. (1905) 15,003.

Sonnenburg (zōn'en-bör*h*), a town of Prussia, district of Frankfort, with silk weaving and other industries. Pop. 5261.

Sonnet (son'et; Italian, *sonetto*), a species of poetical composition, consisting of fourteen rhymed verses, ranged according to rule. It is of Italian origin, and consists of two stanzas of four verses each, called the *octave*, and two of three each, called the *sestette*. The *octave* of the proper sonnet consists of two quatrains, the rhymes of which are restricted to two — one for the first, fourth, fifth, and eighth lines; the other for the second, third, sixth, and seventh. In the *sestette*, which is commonly made up of two tercets, the rhymes may be two or three, variously distributed. This is the Petrarchan or Italian form, but the verses may also be arranged in the Shakespearean form of three quatrains of alternate rhymes clinched by a couplet, or in the irregular form practiced by Coleridge and others. The sonnet generally consists of one principal idea, pursued through the various antitheses of the different strophes. The lightness and richness of the Italian, Spanish, and Portuguese languages enable their poets to express every feeling or fancy in the sonnet; but in English it has been found most suitable to grave, dignified, and contemplative subjects. Among the most successful writers of English sonnets are Shakespeare, Milton, Drummond of Hawthornden, Bowles, Wordsworth, and Rossetti.

Sonometer (so-nom'e-ter), an apparatus for illustrating the phenomena exhibited by sonorous bodies, and the ratios of their vibrations, by the transverse vibrations of tense strings or wires. Also an apparatus for testing metals by bringing them in contact with an induction coil, with which is associated a telephone and microphone. Each metal, acting differently on the coil, produces a different sound.

Sonora (sō-nō'ra), one of the states of Mexico, lying on the Gulf of California, on which it has several good ports. It is generally hilly, and abounds in mineral wealth. Gold is found in washings and mines, and the silver mines are rich and numerous. Corn, maize, beans, peas, tobacco, and the sugar-cane are largely cultivated. Guaymas is the principal port, and has a splendid harbor. The capital of the state is Ures. Area, 76,900 sq. miles; pop. 221,682.

Sonsonate (sōn-so-nä'tā), a town of Salvador, Central America, about 50 miles w. s. w. of San Salvador, with a trade in sugar and shell-work. Pop. 17,016.

Sons of America, Patriotic Order of, a society first organized in Philadelphia in 1847, as the 'Junior Sons of America,' and afterwards reorganized under its present name. Its objects are principally patriotic and benevolent, and its membership is confined to male persons 'born on the soil or under the jurisdiction of the United States of America.'

Sons of Liberty, an American secret society which arose during the Revolution and rendered great aid in the struggle for liberty. The first blood spilled in the war was at the Battle of Golden Hill in New York City, January 19 and 20, 1770, between the Sons of Liberty and the British soldiers. It was at meeting of the Sons of Liberty, held in New York in 1774, that Alexander Hamilton (q. v.), then a youth of seventeen, made his first speech. It had branches in all the 13 colonies. Paul Revere was a leader in New England.

Soochow (sö'chou'), or SUCHOW, a city of China, in the province of Kiangsu, on a lake in the line of the Grand Canal, 80 miles west of Shanghai. It consists of the city proper, with walls 12 miles in circuit; and large suburban areas. It is celebrated for the splendor of its edifices, the beauty of its gardens, the luxury and refinement of its inhabitants, the excellence of its manufactures (among which are silks and

satins, brass, lacquer, gold, and woodwork), and the extent of its trade. It was in great part destroyed in the Taiping rebellion, 1860. Pop. 1,027,091.

Soodras (sö'dras; *Sûdras*), the lowest of the four great castes of India — Brahmans, Kshatriyas, Vaisyas, Soodras. They are chiefly farmers, gardeners, artisans, and laborers of every kind.

Sooloo. See *Sulu.*

Sooranjee (sö-ran'jē), or MORINDIN, a drug used for dyeing, prepared from the root of the *Morinda citrifolia.* See *Morinda.*

Soosoo (sö'sö), a cetaceous mammal, the *Platanista gangeticus,* which resembles the dolphin in form, and attains the length of about 12 feet. It inhabits the Ganges; is most abundant in the sluggish waters of its delta, but is found also as far up the river as it is navigable.

Soosook. See *Susuk.*

Soot (sut, sūt), a black substance formed by combustion, or disengaged from fuel in the process of combustion, rising in fine particles and adhering to the sides of the chimney or pipe conveying the smoke. The soot of coal and that of wood differ very materially in their composition, the former containing more carbonaceous matter than the latter. Coal-soot contains substances usually derived from animal matter; also sulphate and hydrochlorate of ammonia; and has been used for the preparation of the carbonate. It contains likewise an empyreumatic oil; but its chief basis is charcoal, in a state in which it is capable of being rendered soluble by the action of oxygen and moisture; and hence, combined with the action of the ammoniacal salts, it is used as a manure, and acts very powerfully as such. The soot of wood has been minutely analyzed, and found to consist of fifteen different substances, of which ulmin, nitrogenous matter, carbonate of lime, water, acetate and sulphate of lime, acetate of potash, carbonaceous matter insoluble in alkalies, are the principal.

Sophia (sō-fī'a). See *Sofia.*

Sophia, CHURCH OF ST., in Constantinople, the most celebrated ecclesiastical edifice of the Greek Church, now used as a mosque, was built by the emperor Justinian, and dedicated in 558. It is in the Byzantine style of architecture, has a fine dome rising to the height of 180 feet, and is richly decorated in the interior. With the principal dome are connected two half domes and six smaller ones, which add to the general effect. The mass of the edifice is of brick, but is overlaid with marble; the floor is of mosaic work, composed of porphyry and verd antique. The great piers which support the dome consist of square blocks of stone bound with hoops of iron. The numerous pillars supporting the internal galleries, etc., are of white and colored marbles, porphyry, granite, etc., and have capitals of various peculiar forms. The interior of the church is 243 feet in width from north to south, and 269 in length from east to west, and its general effect is singularly fine.

Sophists (sof'ists), the name of a school or congeries of schools of philosophical teachers or 'thinkers,' who appeared in Greece in the period immediately preceding and contemporary with Socrates in the latter part of the fifth century B.C. It was a period of political decline and social corruption, and the sophists were men who, although often able and sometimes well meaning, were not strong enough to rise above the unwholesome influences under which they were placed. Their philosophy (if it can be so called) was one of criticism of those that had gone before; there was nothing creative in it, nothing even formative. The tendency of the teaching of the sophists was mainly skeptical as regards previous philosophical speculation; and while the chief point of convergence of their teaching was in an ethical direction, the influence of their ethical teaching was mostly mischievous. But the sophists rendered considerable service to science and literature, and even indirectly to philosophy. They belonged to all the liberal professions; they taught all the usual branches of knowledge. Some of them were distinguished as rhetoricians and grammarians, others as men of science. Rhetoric, to which they gave undue importance, was systematically studied by them, and they supplied some of the earliest models of good Greek prose. They are accused, however, particularly the later sophists, of being not only superficial in their attainments, but mercenary, vainglorious, and self-seeking in their aims.

Sophocles (sof'o-klēz), the second in order of time of the three great Greek tragic dramatists, was born at Colonos, a village in the immediate vicinity of Athens, in the second year of the seventy-first olympiad, B.C. 495. The rank of his family is not known, but he received an education equal to that enjoyed by the sons of the best Athenian families. Sophocles first appeared as a

dramatist in B.C. 468, when he took the first prize in competition with Æschylus. Æschylus retired to Sicily, and only returned to enter again for a brief period into the lists with Sophocles. Sophocles accordingly held all but undisputed supremacy until the appearance of Euripides, who took the first prize in 441. Sophocles, however, excelled both his rivals in the number of his triumphs. He took the first prize some twenty-four times, the second frequently, the third never. In B.C. 440 he was chosen one of the ten generals in the war against the aristocratic party of Samos. In his old age he suffered from family dissension. His son, Iophon, jealous of the favor he showed to his grandson Sophocles, and fearing he himself should suffer from it in the disposition of his property, summoned him before the judges, and charged him with being incompetent to manage his affairs. In reply Sophocles read a part of the chorus of his *Œdipus at Colonos*, which he had just composed, and at once proved that his faculties were unimpaired. He died about the age of ninety. One hundred and thirty plays in all are ascribed to him, of which seventeen are supposed to be spurious. Eighty-one of his dramas, including the seven now extant, were brought out after he had attained the age of fifty-five. The chronological order of the existing plays is given as follows: *Antigone*, *Electra*, *Trachiniæ*, *Œdipus Tyrannus*, *Ajax*, *Philoctetes*, *Œdipus at Colonos*. Sophocles brought the Greek drama to the highest point of perfection of which that form of art is susceptible. His subjects are human, while those of Æschylus are heroic, and in his management he shows himself a perfect master of human passions. The tendency of his plays is ethical, and he subordinates the display of passions to an end. He also introduced scenic illustration and a third actor. (See *Drama.*) No tragic poet in ancient or modern days has written with so much elevation and purity of style. The versification of Sophocles stands alone in dignity and elegance, and his iambics are acknowledged to be the purest and most regular. One of the best English translations of Sophocles is that by E. H. Plumptre.

Sophocles, from ancient bust.

Sophonisba (sō-fō-niz'ba). See *Masinissa.*

Sophora (so-fō'rå), a genus of plants, nat. order Leguminosæ. The species are ornamental shrubs and trees, found chiefly in central and tropical Asia and the tropical and subtropical parts of South America. They have pinnate leaves, and terminal racemes or panicles of whitish flowers. The species best known in the United States are *S. japonica* and *S. chinensis.*

Soprano (so-prå'nō), the highest register of female voices. Its ordinary range is from C below the treble staff to A above it, though some sopranos may go as high as E. The mezzo-soprano register is from A to F, that is, a third lower than the soprano.

Sora (sō'rä), a town of Sicily, province Caserta, on the Garigliano, see of a bishop. Pop. of town 6149; of commune, 16,022.

Soracte (sō-rak'tē), a celebrated mountain of Italy, 27 miles north of Rome, now called Monte Sant' Oreste; height, 2420 feet.

Sorata (sō-rå'tå), or ILLAMPU, one of the highest of the Andes, a volcanic cone in Bolivia, on the east side of Lake Titicaca; height, 21,484 feet.

Sorau (zō'rou), a town of Prussia, in the province of Brandenburg, 50 miles S. S. E. of Frankfurt. It has a church dating from about 1200, a castle of 1207, manufactures of woolen and linen cloth, dye-works, etc. Pop. 16,410.

Sorb-apple, the fruit of the sorb-tree or service-tree. See *Service-tree.*

Sorbine (sor'bin), SORBITE, a crystalline unfermented sugar ($C_6H_{12}O_6$), isomeric with grape and milk sugar, existing in the ripe juice of the mountain-ash berries (*Pyrus Aucuparia*).

Sorbonne (sor-bon'), a theological institution founded in connection with the University of Paris in 1252 by Robert de *Sorbon*, chaplain and confessor of Louis IX. It exercised a high influence in theological and ecclesiastical affairs from the fourteenth to the seventeenth centuries, but was suppressed during the first revolution. At the reconstruction of the university in 1808 the building erected for it by Richelieu was given to the theological faculty in connection with the faculties of science and belles-lettres; and the Sorbonne is still part of the University of France.

Sorel (sō-rel′), a town and river port of the dominion of Canada, in the province of Quebec, on Lake St. Peter, at the mouth of the Richelieu River, with some manufactures and a considerable trade. It has docks, barracks, an arsenal, Roman Catholic college, convent, etc. Pop. (1911) 8420.

Sorel′, AGNES, mistress of Charles VII of France, born in Touraine, in 1409; died at Jumièges in 1450. She acquired great influence over the king, and was the means of rousing him from his habitual sloth to resist the English invaders.

Soresina (sō-rā-sē′nä), a town of Northern Italy, in the province of Cremona, and 14 miles north of the town of that name, between the Oglio and the Adda. Its chief industries are the vine and silk culture. Pop. 8021.

Sorgho (sor′gō), a species of grass, the *Holcus* or *Sorghum saccharatum.*

Sorghum (sor′gum), a genus of grasses, some species of which are known by the general name of millet. They are tall grasses with succulent stems, and are found in the tropical parts of Asia, whence they have spread to other warm regions. *S. vulgāre* is the largest of the small cereal grains, and is called Guinea-corn and Indian millet. The different kinds are called jowar in India, where many of the inhabitants live upon these small dry grains, as upon rice. It is the dhurra and Kaffir corn of Africa. Sorghum has been introduced into Europe and America, where it is used for fodder and the manufacture of sorghum sirup.

Sorghum vulgare (Indian millet).

Soria (sō′rē-ä), a town of Northeastern Spain, on the Douro. Pop. 7735.—The province of Soria has an area of 3983 sq. miles, and a pop. of 157,850.

Soroki (so-rō′ke), a town of Bessarabia, on the Dniester. Pop. 19,500.

Sorolla y Bastida (so-rōl′ya e bastē′da), JOAQUIN, a Spanish painter, born at Valencia in 1863. Several of his paintings are in the Metropolitan Museum of Art, New York.

Sorrel (sor′el; *Rumex acetosa*), a plant belonging to the nat. order Polygonaceæ. The leaves have an acid taste, and have long been used in salads. The stems are upright, 1½ or 2 feet high, provided with a few arrow-shaped leaves on the inferior part of the stem, and lanceolate ones above. The sheep's sorrel (*R. acetosella*) is of much smaller size than the preceding, with different shaped leaves, but resembles it in habit. Wood-sorrel is of the genus *Oxălis.*

Sorrel-tree (*Oxydendrum arbŏreum*), a tree belonging to the nat. order Ericaceæ. It inhabits the range of the Alleghenies from Virginia to Georgia. The leaves are 4 or 5 inches long, oval-acuminate, finely toothed, and strongly acid in taste. The flowers are small, white, and disposed in long one-sided racemes, clustered in an open panicle.

Sorrento (sōr-en′tō), a seaport of Italy, on the south side of the gulf and 17 miles S. S. E. of the city of Naples. It is delightfully situated, is surrounded by decayed walls, and has a cathedral and various other churches. It has manufactures of silk, and is frequented for sea-bathing, and as an agreeable place of residence in summer. Pop. of town 6969; of commune 8832.

Sothern (suth′ern), EDWARD HUGH, an American actor, son of Edward Askew Sothern, a famous English comedian, born in London December 6, 1859, and first appeared in a small part with his father in 1879. In 1896 he married Virginia Harned, and in 1911 Julia Marlowe. He has starred in many plays, including Shakespearean.

Sothic Period (soth′ik), in ancient Egyptian chronology the period of 1461 years in which the year of 365¼ days circled in succession through all the seasons. The tropical year, determined by the rising of Sirius, was almost exactly the Julian year.

Sotteville-lez-Rouen (sot-vēl-lā-rō-aṇ), a town of France, on the Seine above Rouen, with manufactures of soap, glue, chemical products; railway works, etc. Pop. 18,535.

Souari-nut (sö-ä′rē), the fruit of *Caryocar nucifĕrum*, a native of British Guiana. It is spherical in form, of a reddish-brown color, and measures 5 to 6 inches in diameter. It contains four or fewer seeds embedded in a white pulp. They contain a nutty, oily kernel, which is pleasant to eat, and is exported under the name of butternuts (which see).

Soubise (sö-bēz), BENJAMIN DE ROHAN, SEIGNEUR DE, a famous Huguenot captain, born at Rochelle in 1583, brother of Henri de Rohan, chief of the Protestant party under Louis

XIV. He learned the trade of arms under Maurice of Orange; and when the religious wars again broke out in 1621 he was intrusted with the chief command in Brittany, Anjou and Poitou. He conducted the war with much spirit, but was eventually obliged to seek refuge in England. In 1625 he made a dashing attack upon the royalist fleet in the river Blavet, seized a number of vessels, and captured the islands of Oleron and Ré. He was active at Rochelle during its siege in 1627 and 1628. He died in England in 1642.

Soudan, or SUDAN (sö-dân'), is the Arab name given to the vast and imperfectly defined extent of country in Central Africa which lies between the Sahara on the N., Abyssinia and the Red Sea on the E., the countries draining to the Congo basin on the S., and Senegambia on the W. Its area is roughly estimated at 2,000,000 sq. miles, and its pop. at from 7 or 8 to 30 millions. It is also known as Nigritia. The inhabitants comprise numerous nations of different races, chiefly the Negro, together with Arab colonists and traders. The Western and Central Soudan are divided into a number of semi-independent states: Bambarra, Gando, Sokoto, Adamawa, Bornu, Baghirmi, Wadai, and others. This section is included in the French and British territories or spheres of influence. The Eastern Soudan includes Darfur, Kordofan, Senaar, etc., now under Egyptian control. Egyptian rule was first extended to the Eastern Soudan in the early part of the nineteenth century by Mohammed Ali, under whom Ibrahim Pasha carried it as far south as Kordofan and Senaar. An Egyptian expedition under Sir Samuel Baker in 1870 led to the conquest of the equatorial regions on the Nile farther south than the Soudan proper, of which General Gordon was appointed governor-general in 1874. On the fall of Ismail Pasha of Egypt, Gordon was recalled, and hordes of Turks, Circassians, and Bashi-Bazouks were let loose to plunder the Soudanese. Egyptian misrule then became intolerable, and in this crisis appeared Mohammed Ahmed of Dongola, who gave himself out to be the Mahdi, the long-expected redeemer of Islam, and who overran that whole region. (For its succeeding history see *Egypt* and *Gordon, Charles George.*) In 1878 Emin Pasha (Eduard Schnitzer) was appointed governor of the Equatorial Province on the Upper Nile, north of the Albert Nyanza, by Gordon, and he continued to hold his ground here till 1889, when he was relieved by Henry M. Stanley. A British and Egyptian expedition, under Gen. Kitchener, was sent to reconquer the Soudan in 1898, and captured the Dervish capital of Omdurman, opposite Khartoum, on Sept. 2, after a battle in which the Dervish army suffered immense losses. Since that date the Eastern Soudan has been held by Egypt.

Soul (sōl), the rational and spiritual part in man, which distinguishes him from the brutes, the indwelling spirit of man, which is both immaterial and immortal. Soul is sometimes used as synonymous with *mind*, but generally it is used in a wider sense as being a whole to which pertain the faculties that constitute mind. Soul and *spirit* are more nearly synonymous, but each is used in connections in which it would be improper to use the other. Nearly all philosophies agree in regarding the soul as that part of man which enables him to think and reason, and which renders him a subject of moral government; but they differ when it comes to a question of origin and detail. Many philosophers maintain the indestructibility as well as the immateriality of the soul; but a whole host of others, both in ancient and modern times, have assigned a material basis to consciousness, and all that we regard as belonging to the soul. Modern materialists usually make the soul, or what others regard as such, merely a result of organism. A common set of arguments regarding the soul are as follows: — We know that the soul, as an individual intelligence, has had an origin, for it originated with the beginning of our organized life. We know that it was not self-originated, for nothing could originate in that which had no previous existence. We know that it could not have originated in anything or any number of things without intelligence, for intelligence cannot spring from non-intelligence, which is its contradictory. We know that our soul is related to a bodily organism, which it is capable in many ways of controlling, and through which it is related to the entire physical universe; that in that universe it discovers a uniformity of laws through which it exercises an indefinite control over physical objects, extending in some measure to all with which it comes into communication. We believe, therefore, that this universe is under the control of the Intelligence in whom our soul originated; in other words, that there is one Supreme Being, who is the author of all the harmony of being with which we are by our own participation in it made partially acquainted. We are thus also enabled to return a rational answer to the question as to the immortality of the soul. If the soul has had an intelligent originator it is evident we can know nothing as

to its duration without knowing the design or will of its originator. Psychology, therefore, furnishes the conditions of the problem of immortality, but does not answer it; it refers it to the higher science of theology. The end of philosophy is thus religion. If it does not end here it leads inevitably into skepticism. It is, then, to the views of God supplied either by natural or revealed religion that we must look for light upon the question of the soul and the soul's immortality, and it was from this source that the best and surest arguments of such men as Socrates and Plato were drawn. It must be stated, however, that a large body of scientists, the material section, combat this argument as having no foundation in ascertained fact, and deny the separate existence of the soul and body, maintaining that the mind is a resultant of the forces of the material organism, and that the soul, as a distinct entity, has no existence.

Söul (sė-ųl). capital of Corea, about 27 miles from the sea, not far from the right bank of the Han River, a tributary of the Yellow Sea. The city proper is surrounded by walls, has narrow and dirty streets, and houses generally low and mean. The royal palace and its grounds occupy a great area, and are surrounded by a lofty wall. Silk, paper, tans, mats, etc., are manufactured. Pop. (1912) 278,958.

Souls, CURE OF, is an ecclesiastical charge in which parochial duties and the administration of sacraments are included. In the Church of England the cure of souls in each diocese is primarily vested in the bishop, the clergy of each parish acting as his deputies.

Soult (sölt), NICOLAS JEAN DE DIEU, Duke of Dalmatia and Marshal of France, was born of humble parentage at Saint Amans la Bastide, in the department of Tarn, in 1769, and in 1785 entered an infantry regiment as a common soldier. Raised from the ranks, he became successively lieutenant and captain in his regiment. At that time he served on the Upper Rhine, and greatly distinguished himself at Kaiserslautern, Weissenburg, Fleurus, and other places, and after successive promotions was named general of division by Masséna, to whose army he was attached. In the unsuccessful campaign in Italy he was wounded and taken prisoner, but obtained his liberty after the victory of Marengo, in 1800. In 1803 he had the command of one of the three camps of the army intended against England, that at St. Omer. He was one of the marshals created immediately after the formation of the empire in 1804; and in the Austrian war in 1805 distinguished himself at Ulm and Austerlitz. He acquired new fame in the Prussian campaign; and in 1807, after the battle of Friedland, took Königsberg. From 1808-12 he fought in Spain, but, over-matched by Wellington, was unable to gain many laurels. In 1813 he was recalled, in consequence of Napoleon's disasters, to take the command of the fourth corps of the grand army, and commanded the infantry of the guard at Lützen. On the news of Wellington's victory at Vittoria he was sent back to reorganize the French force in Spain, and did his utmost to oppose Wellington's triumphant career

Marshal Soult.

till Napoleon's abdication. Soult gave in his adhesion to Louis XVIII, who appointed him commander of the thirteenth military division; and in 1814 made him minister of war. On Napoleon's return he joined his standard, and held the post of major-general of the army in the campaign of Waterloo. After the second restoration he took up his residence at Düsseldorf, but was permitted to return to France in 1819; and in 1827 was raised to the peerage. After the July revolution of 1830, and on two subsequent occasions, he held ministerial office, and in 1846, on retiring from public life, was created grand-marshal of France. He died in 1851.

Soumy (sö'mi), or SUMY, a town of Russia, in the government of Kharkov, with a large trade in spirits and agricultural produce, and four large annual fairs. Pop. 26,622.

Sound. See *Acoustics* and *Ear*.

Sound, THE, a strait which connects the Kattegat and Baltic Sea, and separates the Danish Island of See-

CARIBBEAN SEA
ATLANTIC OCEAN
PACIFIC OCEAN
MARTINIQUE (Fr.)
SANTA LUCIA (Br.)
ST. VINCENT (Br.)
BARBADOS (Br.)
GRENADA (Br.)
TOBAGO (Br.)
TRINIDAD (Br.)
Port of Spain
Barranquilla
Cartagena
Maracaibo
Puerto Cabello
La Guaira
Valencia
Barcelona
Caracas
Orinoco Delta
Merida
Orinoco R.
Ciudad Bolivar
VENEZUELA
Medellin
Antioquia
Bucaramanga
Honda
Bogota
Meta R.
Atures
Georgetown
Paramaribo
Cayenne
BRITISH
DUTCH
FRENCH
GUIANA
C. Orange
Sierra Pacaraima
Buenaventura
Cali
Popayan
Bolivar
COLOMBIA
Tumaco
Quito
Guayaquil
Cotopaxi
Chimborazo
ECUADOR
Cuenca
Iquitos
Loreto
Piura
Chiclayo
Trujillo
Huaraz
Pasco
Callao
Lima
PERU
Ayacucho
Cuzco
Ica
Arequipa
Puno
Mollendo
Tacna
Arica
L. Titicaca
Mt. Illampu
La Paz
Oruro
Cochabamba
Santa Cruz
Sucre
Potosi
BOLIVIA
Iquique
Tocopilla
Antofagasta
Taltal
Caldera
Serena
Ovalle
Valparaiso
Santiago
Talca
Concepcion
Temuco
Puerto Montt
Ancud
CHILOE
Puerto Madrin
Rawson
Viedma
Mendoza
Mercedes
Rosario
Buenos Aires
La Plata
Azul
Tandil
Bahia Blanca
General Acha
General Roca
Negro R.
Blanca Bay
C. Corrientes
S. Matias Gulf
Gulf of St. George
C. Tres Puntas
Gulf of Penas
S. Valentin
Mt. San Valentin
CAMPANA I.
WELLINGTON I.
MADRE DE DIOS I.
Strait of Magellan
Punta Arenas
TIERRA DEL FUEGO
Mt. Darwin
STATEN I.
WOLLASTON IS.
C. Horn
Santa Cruz
Grande Bay
FALKLAND IS. (Br.)
Port Stanley
Gulf of Guayaquil
Pt. Parina
C. San Francisco
C. Corrientes
Gulf of Panama
Panama Canal
Panama
Colon
Pacific Ocean
Mouths of the Amazon R.
Braganca
Para
Maranhao
Granja
Parnahiba
Ceara
Aracati
C. S. Roque
Theresina
S. Francisco
Carolina
Parahiba
Pernambuco
Aiagoas
Joazeiro
Penedo
Aracaju
Bomjardim
Cachoeira
Bahia
Rio de Contas
Palma
Cannavieras
Goyaz
Paracatu
Porto Alegre
Diamantina
Bello Horisonte
Ouro Preto
Victoria
Petropolis
Campos
Campinas
Rio de Janeiro
Sao Paulo
Santos
Curitiba
Paranagua
Desterro
Laguna
Itaquay
Cruz Alta
Rio Pardo
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Porto Alegre
Salto
Pelotas
Rio Grande do Sul
Fray Bentos
Colonia
Chuy
Montevideo
URUGUAY
Parana
Plata R.
BRAZIL
Matto Grosso
Cuyaba
Trinidad
Beni R.
Mamore R.
Guapore R.
Madeira R.
Tapajos R.
Xingu R.
Tocantins R.
Araguaya R.
Purus R.
Juruha R.
Yavari R.
Ucayali R.
Maranon R.
Napo R.
Yapura R.
Negro R.
Amazon River
Branco R.
Trombetas R.
Oyapok R.
Obidos
Manaos
Santarem
Serra Geral Mts.
Francisco R.
San R.
Paraguay R.
PARAGUAY
Asuncion
Villa Rica
Villa Pilar
Corrientes
Concepcion
Puerto Pacheco
Tarija
Pilcomayo R.
Jujuy
Tucuman
Catamarca
Rioja
Cordoba
Mendoza
Santiago
Talca
Concepcion
Temuco
Valparaiso
Andes Mts.
Parana R.
Iguazu R.
Uruguay R.
Tibagy R.
Ivahy R.
Tiete R.
Grande R.
Paraiba R.
Rio de Janeiro
Tropic of Capricorn
Equator
GALAPAGOS IS. (To Ecuador)
ALBEMARLE I.
INDEFATIGABLE I.
ST. FELIX (To Chile)
ST. AMBROSE (To Chile)
MAS A FUERA I. (To Chile)
MAS A TIERRA I. (JUAN FERNANDEZ IS.) (To Chile)
LOBOS IS.
Hammond's Political Map of South America
Copyright by, C.S. Hammond & Co., N.Y.
POLITICAL MAP OF SOUTH AMERICA
SCALE OF MILES
0 100 200 400 600 800 1000
80° 70° 60° 50° 40° 30° Longitude West from Greenwich
90° 80° 70° 60° 50° 40° 30° 20° 10° 0° 10° 20° 30° 40° 50°
16

land from Sweden. Its length, nearly due north and south, is 66 miles, and its greatest breadth, measured from Copenhagen, eastward, is 17 miles. The name Sound, however, is more properly applied to the narrow part of the passage, which, between Elsinore and Helsingborg, has a width of only 3 miles. Formerly by almost immemorial custom, sanctioned by treaties, and finally confirmed by the Congress of Vienna in 1815, all merchant vessels passing the Sound had to pay duty to Denmark at Elsinore. But in 1857 the duties were abolished by treaty, England paying one-third of the indemnity. See *Elsinore.*

Sounding, the operation of trying the depth of water and the quality of the bottom, especially by means of a plummet sunk from a ship. In navigation two plummets are used, one called the *hand lead*, weighing about 8 or 9 lbs.; and the other, the *deep-sea lead*, weighing from 25 to 30 lbs. (See *Lead.*) The former is used in shallow waters, and the latter at a distance from shore. The nature of the bottom is commonly ascertained by using a piece of tallow stuck upon the base of the deep-sea lead, and thus bringing up sand, shells, ooze, etc., which adhere to it. The scientific investigation of the ocean and its bottom has rendered more perfect sounding apparatus necessary, and has led to the invention of various contrivances for this purpose, among the most simple and common of which is Brooke's sounding apparatus. Some of the deepest sea-soundings yet obtained that can be relied on were obtained during the expedition of the *Challenger.* See *Ocean.*

Soup (söp), a decoction of flesh in water, properly seasoned with salt, spices, etc., and flavored with vegetables and various other ingredients. There are very many kinds of soup, the introduction of a different ingredient furnishing the occasion for a distinctive name, but they may all be divided into two classes — clear soup and thick soup. *Maigre* soup is a soup made without meat.

Sourabaya (sö-rå-bä'yå), a seaport of Java, capital of a province of the same name, on the Strait of Madura. It possesses a large and secure harbor; a building-yard, graving dock, and an extensive trade in exports of native produce, and imports a large number of European manufactures. Pop. 146,944.

Sourakarta (sö-rå-kär'tå), or SOLO, a town of Java, capital of the province of the same name, 140 miles W. S. W. of Sourabaya. It has manufactures of cotton and other tissues, leather, etc. Pop. 109,459.

Sour-gum. See *Tupelo.*

Sour-sop. See *Anona.*

Sousa, JOHN PHILIP, American bandmaster and composer, born in Washington, D. C., in 1856. In 1892 he organized his own band, with which he earned fame both in Europe and America. His compositions, especially his marches, are popular throughout the world.

Sousdal, or SUSDAL (sös'dal), a town of Russia, in the government of Vladimir, in a fertile plain on the Kamanka. Pop. 8000.

Soutane (sö-tān'), the common outer garment worn by the clergy in the Roman Catholic Church.

South, ROBERT, a celebrated divine of the Church of England, the son of a London merchant, born at Hackney in 1633, and educated at Westminster School and Christ Church, Oxford. In 1660 he was chosen public orator of the University of Oxford; in 1663 he was appointed a prebendary of Westminster: in 1670 canon of Christ Church; in 1676 he went to Poland as chaplain to the English ambassador, and on his return became rector of Islip. He died in 1716.

South African Union. See *Union of South Africa.*

South Amboy, a city of Middlesex Co., New Jersey, on Raritan River at the head of Raritan Bay, 27 miles S. W. of New York, on 3 railroads. It is a noted coal-shipping port (tidewater) and has manufactures of pottery, cigars, underwear, etc. Pop. 7897.

South America, is a vast peninsula of a roughly triangular form, with its apex pointing southward, extending in length from lat. 12° 30′ N. to Cape Horn in lat. 55° 59′ S. Its greatest length is 4592 miles; its greatest breadth 3230 miles; area, nearly 7,000,000 sq. miles. Some of the general features and relations of South America to North America are already described under *America*, but supplementary particulars are here given.

Physical Features.— South America is united to North America by the Isthmus of Panama. Its coast-lines, especially that of the west, are comparatively little broken or interrupted by indentations, and in this respect resemble those of Africa. Towards the southern extremity is a group of islands, forming the archipelago of Tierra del Fuego. They are penetrated in every direction by bays and narrow inlets, ending often in glaciers.

The mountainous and elevated tracts of the continent are chiefly limited to the borders of the Pacific and Atlantic Oceans, the intervening space being occupied by a great series of plains, reaching from one extremity of the continent to the other, at an elevation generally less than 1000 feet above the level of the sea. There are four chief mountain systems, the most remarkable of which is the Andes, that stretch along the whole of the west coast from south to north for a distance of 4500 miles. They are of inconsiderable width comparatively, but attain great elevations, ranking in this respect next to the Himalaya Mountains; the highest known peak, Aconcagua, in Chile, being 22,860 feet high. (See *Andes.*) The second system is that of Parima, also called the Highlands of Guiana, in the northeast; culminating point, Maravaca, about 10,500 feet high. The third system is near the north coast, and is known under the general name of the Coast Chain of Venezuela; culminating point, the Silla de Caracas, with an elevation of 8600 feet. The fourth is that of Brazil, in the southeast; culminating point, Itatiaia, 10,040 feet high. There are altogether upwards of thirty active volcanoes in South America. They all belong to the Andes, and consist of three separate and distinct series: the series of Chile, of Peru and Bolivia, and of Quito. The loftiest is Gualateïri in Peru, which reaches a height of 21,960 feet. The immense plains are one of the remarkable features of South America, sometimes stretching for hundreds of miles without exhibiting the slightest perceptible inequality. They are variously designated, being known as *pampas* in the south, as *selvas* in the Amazon region, and as *llanos* in the north. All the South American rivers of any magnitude carry their waters to the Atlantic. The principal rivers are the Amazon, the Orinoco, and the Plata (which see), the first being the greatest as regards volume of water among the rivers of the world. One of the most singular features in the hydrology of South America is the water connection existing between the Orinoco and the Amazon through the natural channel of the river Cassiquari. As explained under *Brazil* (which see) it would not be difficult to establish inland communication by water from the Orinoco to the Plata. The lakes of any considerable size are few; the largest, Lake Titicaca, in the Andes, 12,500 feet above sea-level, covers an area of above 4000 square miles.

Climate and Productions.— Naturally there are considerable diversities of climate in the different parts of the continent, but only in comparatively few are the extremes of heat and cold very great, and on the whole South America is neither very hot nor unhealthful, though so much of it is within the tropics. Over great part of it the rains are adequate, and in many parts abundant; but on the west coast there are small regions where rain seldom or never falls. The most distinguishing feature of the vegetation of South America is its prodigious forests, which cover about two-thirds of the whole continent, and yield valuable timber, ornamental woods and dyewoods, cinchona, india-rubber, vegetable ivory, etc. In the tropical regions vegetation is on the grandest scale, grandeur also being combined with great beauty. Fruits abound, including oranges, limes, pineapples, mangoes, bananas, pomegranates, and many others. Southward of the line coffee, sugar-cane, maize, and cacao are among the chief products. The most valuable vegetable products exported are coffee, cotton, wheat, and cacao. Among plants specially belonging to South America are cacao, cinchona, coca, and Paraguay tea. The domesticated native animals of South America are the llama and alpaça, both used as beasts of burden, and yielding a kind of hair which is exported and manufactured into tissues. Wild animals of many species abound, some of them, as the sloths, the armadillo, etc., peculiar and interesting. Horses, at first imported, and cattle now roam wild over the southern plains. Large numbers of sheep are also reared, and wool, hides and skins, live animals, meat, etc., are now exported. Gold and silver, copper, niter, guano, and precious stones are also important products of South America.

People.— The aborigines of South America are undoubtedly of the same race as those of North America, as there exists a very striking general physical resemblance between the native races throughout the whole of the American continent, from Cape Horn to Behring's Straits. (See *America* and *Indians.*) They are almost all of a copper color, with long black hair, deep-set black eyes, aquiline nose, and often handsome slender form. In South America these red men are far more numerous than in North America, and though many are half-civilized, a greater number are in a state of barbarism. A considerable portion of the population also consists of persons of Spanish and Portuguese blood, and along with these a far greater number of mixed Indian and European blood, civilized, and forming an important element in the various states of the continent. To these are

now being added considerable numbers of Spanish and Italian immigrants.

Divisions.— South America comprises the republics of Colombia, Ecuador, Venezuela, Peru, Bolivia, Chile, Argentina, Brazil, Paraguay, and Uruguay, besides the colonies of British, French, and Dutch Guiana and the Falkland Islands (British). For the areas and populations of these see the separate countries.

Discovery, etc.— The first discoverer of the continent of South America was Christopher Columbus, who reached the mouth of the Orinoco in his third voyage (1498). The adventurer next to follow was Alonzo de Ojeda, a Spaniard, who examined the coast of Venezuela. Ojeda was accompanied by Amerigo Vespucci, a native of Florence, who, on his return to Spain, published an account of his voyage, which led to his name being gradually given to the continent. Brazil was discovered in 1500 by Vincent Yanez Pinzon, who explored the mouths of the Amazon. Later in the year Alvarez Cabral reached the coast of Brazil farther south than the point touched by Pinzon, and took possession of the country in the name of the King of Portugal. In 1513 Vasco Nuñez de Balboa crossed the Isthmus of Darien, and discovered the Pacific Ocean. In 1531 Pizarro embarked at Panama with a small force, and made himself master of Peru. Almagro, a companion of Pizarro, pushed southwards into Chile, and in 1537 the country between Darien and Peru was traversed by Vadillo, and Quito was soon after taken possession of by the Spaniards. In 1540 Gonzales, the brother of Pizarro, crossed the Andes and came upon the Amazon, which Orellana, one of his officers, descended to the ocean. In the meantime Juan de Solis had discovered the La Plata in 1515, and Fernando Magellan sailed along the southeast coast and through the strait that bears his name into the Pacific (1520). In 1526 Sebastian Cabot ascended the Paraná and Paraguay, and established two or three forts, and in 1536 the city of Buenos Ayres was built. The discoveries of the Spanish and Portuguese gave the possession of almost the whole of South America to these nations — Portugal holding Brazil, while Spain held the remainder. The colonial system of Spain was a highly vicious and oppressive one, and the colonies seized the first opportunity to cast off their allegiance to the mother country, early in the nineteenth century, when Spain was in difficulties from Napoleon's conquests. The Spaniards attempted to bring them back to their allegiance by force, and a series of struggles took place between the colonial and Spanish troops which lasted till 1824, when the independence of the colonies was finally secured. Brazil became independent of Portugal in 1822 and a republic in 1839, all the Spanish colonies having also become republics.

Southampton (south-amp'tun), a borough and seaport town of England, in the county of Hants, on a peninsula at the mouth of the Itchen, near the head of Southampton Water, 18 miles N. W. of Portsmouth, and 79 miles S. W. of London. It is built on rising ground, and consists of an old and a new town, the former at one time surrounded by walls flanked with towers, of which portions still remain; and entered by several gates, of which three, still standing, bear the names of West Gate, South Gate, and Bar Gate. The last, a remarkable structure, and large enough to contain the town-hall in the upper part of it, is now, in consequence of the growth of the town, nearly in its center, and being placed across the principal street, divides it into two parts, the part to the north being named Above-bar, and that to the south Below-bar, or High Street. The streets in the older quarters are very irregular, while those in the more modern portion present many fine ranges of building. St. Michael's, the oldest of the churches, situated in the west part of the town, is a spacious Norman structure with many interesting features. Other buildings of interest are the Southampton College, the Hartley Institution, the guild-hall, custom-house, audit-house, the theater, philharmonic rooms, assembly-rooms, ordnance map office, baths, etc. The first tidal-dock was opened for business in 1842, and the docks are now of great extent. There is ample dock accommodation, and Southampton is the most important mail-packet station in the kingdom. The manufactures are chiefly confined to brewing, coachbuilding, iron-casting, sugar-refining, and shipbuilding. Southampton claims to be a borough by prescription, but its earliest known charter was granted by Henry II. Pop. (1911) 119,039.

Southampton, Earl of, Thomas Wriothesley, first earl, born about 1490, and educated at Cambridge, became lord-chancellor of Henry VIII in 1544. He was one of the executors of the will of Henry, and was created Earl of Southampton by Edward VI. Died in 1550.— Henry Wriothesley, third earl, grandson of the preceding, born in 1573, was a patron of Shakespere, who dedicated to him the poems of *Venus and Adonis*, and the *Rape of*

Lucrece. He was a friend of the Earl of Essex, and was accused of complicity in the latter's treasonable designs. He was convicted and sentenced to death and attainder; but the death sentence was remitted by Elizabeth, and the attainder was removed by parliament after the accession of James. He was a firm supporter of liberty, and in 1621 was committed to close custody by the king, but was released through the influence of Buckingham. He aided the Dutch in their struggle against Spain, and died at Bergen-op-Zoom, November, 1624.— THOMAS WRIOTHESLEY, fourth earl, son of the preceding, born in 1600, was at first a supporter of the Commons in resisting the encroachments of Charles I, but with Strafford went over to the royal side, and was made a privy-coancilor. Being one of the leaders of the moderate party, he lived unmolested in England during the Commonwealth. Upon the restoration of Charles II he was made lord high treasurer. He died in 1667.

Southampton Water, an inlet of the sea, in the south of England, about 11 miles in length, running from the Solent into Hampshire in a N. W direction. It receives the rivers Anton, Itchen, and Hamble. At its head is Southampton.

South Australia, a state in the Commonwealth of Australia, forming the central and southern part of the continent, bounded by Western Australia on the west, Queensland, New South Wales and Victoria on the east, and Northern Territory on the north. Formerly Northern Territory was included in South Australia, but was constituted a separate division in 1911. The state has an area of 380,000 square miles. The southern coast line, which is more indented than in any other part of the commonwealth, extends about 1500 miles from N. W. to S. E., embracing Spencer's and St. Vincent Gulfs, with Eyre Peninsula and Kangaroo Island. Several short ranges of mountains are distributed over the state, culminating in Flinders Range, on the northeastern side of Spencer Gulf. The Gawler Range extends from near Port Augusta to Streaky Bay, crossing the Eyre Peninsula. The highest point in any of these ranges is not much more than 3000 feet. The tableland in Eyre Peninsula, west of Spencer Gulf, averages 1300 feet in height. The Murray, which has its rise in the Australian Alps, pursues the lower part of its course in South Australia, and is the only navigable river in the southern part of the state. Small streams, however, are abundant. Lakes are plentiful, the largest of them being Lakes Gairdner, Torrens and Macfarlane. There are great areas of excellent agricultural land and extensive, well-wooded mountain ranges, interspersed with barren plains, stony or sandy, or covered with scrub. The climate is generally characterized by great dryness; the very hot months are December, January, February, and March; the other eight months are more enjoyable, although the temperature is never very low. Large portions of the barren area are being reclaimed by means of artesian wells and waterworks. The soil and climate of the south are admirably adapted for the growth of wheat, and barley also yields a good return. Many parts are suitable for the growth of the vine, the olive, the mulberry, the orange, and other fruits; and these are now extensively cultivated. The shorthorn breed of cattle thrives well, but the rearing of live stock is chiefly confined to sheep, of which there are nearly eight millions. For purposes of exploring the arid plains of the interior camels have been introduced and breed fast. The mineral resources of South Australia have not yet been thoroughly explored, but it has been found to possess deposits of copper, iron, and silver-lead, with small quantities of gold, tin, and bismuth. The chief exports are wool, wheat and flour, copper ore, wine and brandy.

South Australia was first occupied in 1836 by emigrants from Great Britain sent out by a colonization association. They found a convenient landing place in the Gulf of St. Vincent (now Port Adelaide), and selected the site of Adelaide, their future capital, some seven miles inland upon the Torrens River. Adelaide, incorporated in 1840, was the first proclaimed city of Australia. South Australia was made a crown colony in 1841. Under the lavish administration of the early governors the colony incurred state debts and got into financial difficulties, but judicious retrenchment and especially the discovery, in 1843, of copper deposits helped to secure the prosperity of the colony. This prosperity was seriously retarded by the migration which took place when gold was discovered in Victoria in 1851. Since then, however, the general prospects have improved, the agricultural, pastoral and mineral industries being now in a flourishing condition. In 1857 Sir Robert Richard Torrens introduced his Real Property Act (see *Torrens System*), which provided for the registration of titles to real estate, a system that is now employed in Great Britain, parts of Canada and some of the United States and Territories. The first representative constitution was adopted in 1851. The Northern Territory was annexed to South Australia in 1863 and continued as a part

SOUTH
CAROLINA
Scale of Miles
0 5 10 20 30 40
Longitude 80°30′ West G from 80° Greenwich
ATLANTIC OCEAN
NOR. CAR.
GEORGIA
NORTH CAROLINA
COLUMBIA
Charleston
Mt. Pleasant
Moultrieville
Georgetown
Greenville
Spartanburg
Gaffney
Union
Chester
Yorkville
Lancaster
Camden
Sumter
Florence
Marion
Darlington
Cheraw
Dillon
Orangeburg
Aiken
Augusta
Barnwell
Bamberg
Branchville
Walterboro
Beaufort
Port Royal Sound
St. Helena Sound
HILTON HEAD I.
Newberry
Laurens
Clinton
Greenwood
Abbeville
Anderson
Piedmont
Williamston
Pelzer
Edgefield
Batesburg
Winnsboro
Summerville
Kingstree
Manning
Bull Bay
Savannah R.
Allendale
Millen
Milledgeville
Sandersville
Louisville
Waynesboro
Swainsboro
Statesboro
Dublin
Jeffersonville
Adrian
Stillmore
Vidalia
Washington
Madison
Athens
Elberton
Lumberton
Parkton
Fayetteville
Aberdeen
Hamlet
Wadesboro
Monroe
Maxton
Chadbourne
Boardman

of the original colony till 1911, when the separation took place. The railroads, telegraphs and telephones are in the hands of the government. South Australia took a leading part in the federation of the Australian colonies, which were merged under the name of the Commonwealth of Australia in 1901. (See *Australia.*) The state government consists of an upper and lower house, known as the Legislative Council (20 members elected for 6 years) and the House of Assembly (46 members elected for 3 years). South Australia was the first state in the commonwealth to adopt woman suffrage. The population in 1916 was 430,000, exclusive of aboriginals. The capital is Adelaide; pop., including suburbs, 205,000.

Northern Territory, formerly included in South Australia but now erected into a separate state, extends from the 26th parallel of south latitude to the Indian Ocean; area, 523,620 square miles. Port Darwin, the capital, has an excellent harbor. The state is sparsely populated, there being only 4956 white inhabitants according to the 1916 estimates, with 30,000 to 50,000 aboriginals.

South Bend, a city of Indiana, county seat of St. Joseph county, is located on the St. Joseph River 86 miles east of Chicago. It is an important railroad and industrial center. Notre Dame University and St. Mary's Academy adjoin the city. It has extensive manufactures of vehicles, plows, sewing-machine cases, watches, underwear, shirts, furniture, toys, farming implements, automobiles, etc. It has many fine public buildings and points of historical interest. It was incorporated in 1835 and chartered as a city in 1865. Pop. (1910) 53,684; (1920) 70,983.

South Bethlehem, a city of Northampton Co., Pennsylvania, on the Lehigh River, opposite Bethlehem, 56 miles N. by W. of Philadelphia; served by four railroads. It is the seat of Lehigh University; also of Bishopthorpe School, and St. Luke's Hospital. It is one of the most important iron and steel manufacturing points in the Lehigh Valley, and has brass works, knit goods, and other factories. Now merged with Bethlehem. Total pop. 50,358.

Southbridge (south'brij), a village of Southbridge township (town), Worcester Co., Massachusetts on the Quinebaug River, about 32 miles E. of Springfield. Its manufactures include cotton and optical goods, shoeknives, general cutlery, shuttles, etc. Pop. (1920) 14,245.

South Carolina, one of the South Atlantic States and of the thirteen original members of the American Union, is bounded N. and N. E. by North Carolina, S. E. by the Atlantic Ocean, W. and S. W. by Georgia. Its greatest length from east to west is about 275 miles; greatest breadth 210 miles; area 30,989 sq. miles. It is separated from Georgia by the Savannah and Chattooga rivers, and is of roughly triangular shape. The surface features closely resemble those of North Carolina. For 100 miles inland from the coast the land is low and level, the soil sandy, with numerous swamps and extensive pine forests; west of this lies a tract of low sand hills, with moderately productive soil. On the western edge of this belt the land rises abruptly, continuing to rise until it terminates in the Blue Ridge mountain range, the highest peak of which within the State is Rich Mountain, 3569 feet high. The swamp lands have an area of over 1,000,000 acres and the pine forests of 6,000,000 acres. From Little River Inlet to the Savannah the coast extends about 200 miles in a S. W. course, with a number of harbors, the only first-class ones being those of Charleston and Port Royal. The chief rivers are the Great Pedee, Santee and Savannah, the latter on the southern border. The rivers Ashley and Cooper flow into Charleston harbor. Within the range of sea islands that line the coast there is a safe and tranquil passage for river steamers. These islands are mainly devoted to the growth of sea-island cotton and rice, and the tidal swamps to rice. Corn and cotton are cultivated in the forest region, and rice, cotton, Indian corn and vegetables in the swamp lands, when drained. Rice, cotton and corn thrive best in the southwestern counties and corn, wheat, barley, oats, tobacco and fruits in the northwest. Figs and pomegranates thrive in the lower counties, and the peach and grapes over the State generally. Strawberries are abundant and a great variety of fruits are grown. The most important crop is cotton, of which 1,475,000 bales were raised in 1919. The State is also a leading one in rice cultivation.

The mineral wealth of South Carolina includes gold and silver, both mined to a small extent, iron, manganese, copper and lead. But the mineral of greatest importance is phosphate rock, which occurs abundantly in the lowlands and river beds near Charleston and is mined for fertilizing purposes. The granite industry also is important and there are immense beds of porcelain clay. Of the manufacturing industries of the State that of cotton is much the most im-

portant, lumber and timber products ranking second in value. Tar, turpentine, cotton-seed oil, woolens, flour, machinery, and leather tanning and currying are other industries of some importance. Stock raising and wool-growing are carried on with profit and the fisheries are of value. There are about 4000 miles of railroad. The climate of the pine regions is dry and healthful; the mountain districts have a delightful summer climate and are much visited by tourists. Among the educational institutions are the University of South Carolina, at Columbia (founded 1805; students, 578); Clemson Agricultural College; Allen University, colored, at Columbia, etc.

The first settlement of South Carolina was made at Port Royal about 1670, but a permanent settlement was not made until 1680, when Charleston was founded. In 1695 the cultivation of rice was introduced, and that of cotton followed. The Carolinas were divided into North and South Carolina in 1729, and the latter State took an early and active part in the revolution. The State asserted its right to secede from the Union in 1852, and was the first to secede in 1860, the firing on Fort Sumter, in Charleston harbor, being the opening event in the Civil war. Capital, Columbia. Pop. (1900) 1,340,316; (1910) 1,515,400; (1920) 1,683,724.

Southcott (south'kut), JOHANNA, a religious fanatic, whose extravagant pretensions attracted a numerous band of converts in London and its vicinity. She was born in the west of England about the year 1750, of parents in very humble life, and, being carried away by a heated imagination, gave herself out as the woman spoken of in the Book of Revelations. She announced herself as the mother of the promised Shiloh. She died in 1814. Her followers numbered at one time 100,000, but are now extinct.

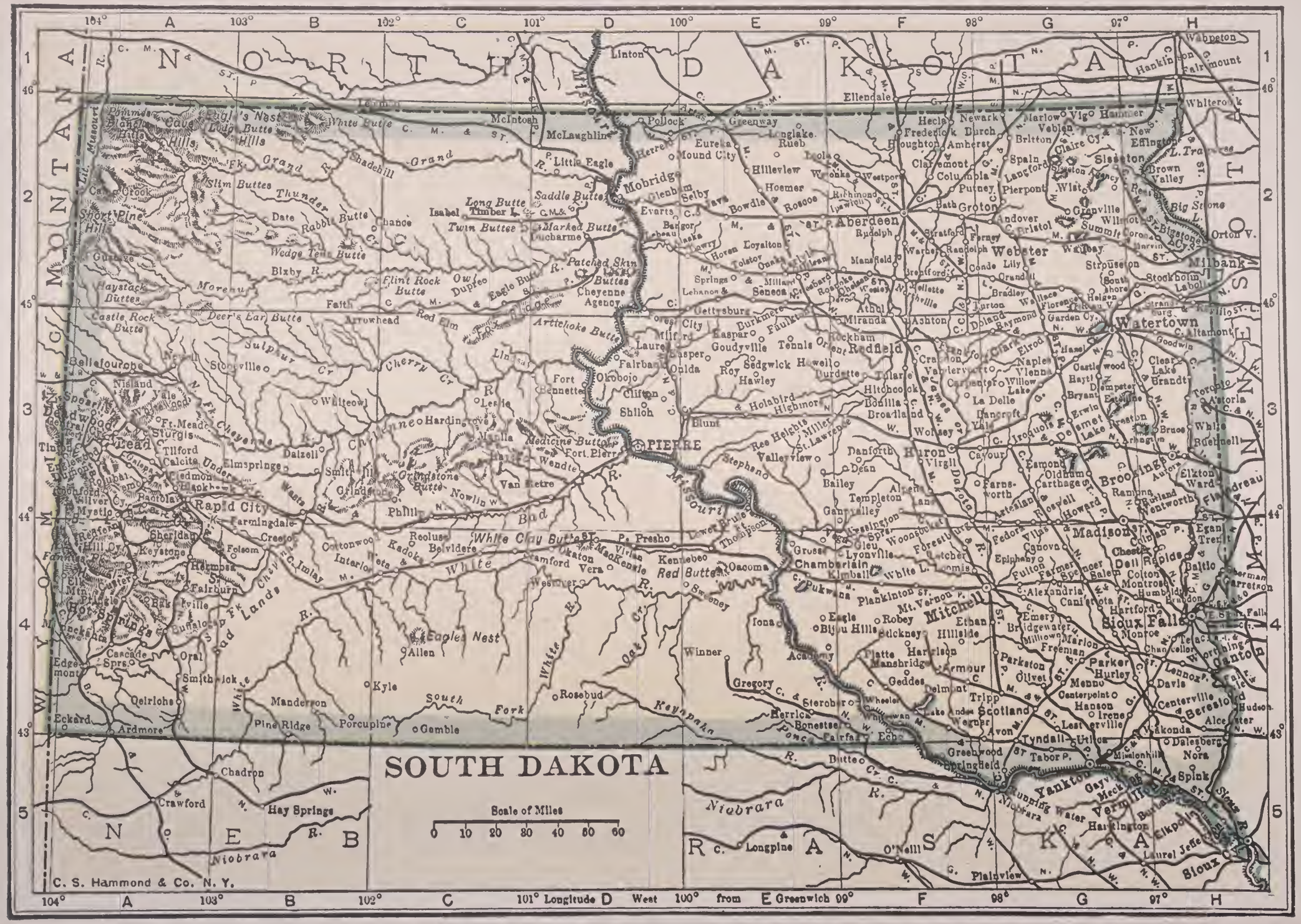
South Dakota, a northwestern American State, bounded N. by North Dakota, E. by Minnesota and Iowa, S. by Nebraska, and W. by Montana and Wyoming. Length, east to west, nearly 360 miles; width, about 240 miles; area 77,615 sq. miles. Its principal river is the Missouri, which divides the State into two nearly equal portions, and is navigable for boats up to 600 tons burden. That portion of the State east of the Missouri is mostly rolling prairie. Through this section run two parallel plateaus, and between them flows the James or Dakota River, which furnishes much irrigation. West of the Missouri the plain is more uneven, with many hills and buttes, finally culminating towards the southwest in the Black Hills, a rugged region of upheaval with more than 3500 sq. miles within the State. Its elevation is about 4000 feet, rising to 7216 in Harney Peak. South of these hills are the Bad Lands, so-called from their difficulty of travel rather than from barrenness. This region is well adapted to stock-raising. The Black Hills contain rich gold mines and also yield tin, silver, copper, iron, coal, gypsum, marble, petroleum, and other minerals. They are largely forested, and with the aid of irrigation much of the region might be adapted to agriculture.

In most sections of the State the soil is highly fertile and agriculture is the leading pursuit. Wheat and corn are the staple crops, the fine quality of the wheat giving it a world-wide reputation. In the south, corn is the most important crop. Other crops are oats, barley, potatoes, flax, hay, vegetables, and fruits. Stock-raising is profitable in all parts of the State, the wool crop being large, while the abundant growth of corn makes hog-raising remunerative. The climate is dry and bracing. The University of South Dakota, founded in 1882, is at Vermilion; students (1920) 981; the State School of Mines at Rapid City. In 1919 the wheat yield was 30,368,000 bushels; corn, 97,000,000 bushels; oats, 55,030,000 bushels. The length of railroad in 1920 was about 4300 miles.

The region of the Dakotas was part of the Louisiana Purchase of 1803; it was organized into a Territory in 1861; the discovery of gold in the Black Hills gave it a great increase of population, and in 1889 it was divided into North and South Dakota and admitted as two States to the Union. Capital, Pierre. Pop. (1900) 401,570; (1910) 583,886; (1920) 636,547.

Southend (south'end), a seaport and watering-place of England, on the estuary of the Thames, Essex, 42 miles E. of London by rail. It is a popular resort of Londoners, both on account of its facilities for sea-bathing and for its pleasant outlook over the Thames. Its pier is the longest in England (nearly 1¼ mile). Pop. (1911) 62,723.

Southern (suth'ern), THOMAS, an English dramatist, born in Ireland about 1660; educated at Trinity College, Dublin. He was called to the bar at the Middle Temple but soon abandoned the law for dramatic literature. He wrote in all ten plays, of which the most popular were *Isabella, or the Fatal Marriage*, and *Oroonoko*. He died in 1746.


SOUTH DAKOTA
Scale of Miles
0 10 20 30 40 50 60
C. S. Hammond & Co. N. Y.
104° A 103° B 102° C 101° Longitude D West 100° from E Greenwich 99° F 98° G 97° H
NORTH DAKOTA
MONTANA
NEBRASKA
IOWA
MINNESOTA
Missouri R.
Grand R.
Cheyenne R.
White R.
Niobrara R.
Big Sioux R.
Pierre
Mobridge
Aberdeen
Watertown
Huron
Madison
Mitchell
Sioux Falls
Yankton
Rapid City
Deadwood
Lead
Hot Springs
Chamberlain
Winner
Gregory
Scotland
Parker
Milbank
Redfield
Webster
Groton
Sisseton
Wahpeton
Hankinson
Fairmount
Whitewood
Ellendale
Linton
McIntosh
Pollock
Greenway
Eureka
Mound City
Herreid
Little Eagle
Timber L.
Isabel
Selby
Bowdle
Roscoe
Hoven
Java
Evarts
Long Butte
Saddle Butte
Twin Buttes
Marked Butte
Patched Skin Buttes
Cheyenne Agency
Flint Rock Butte
Owl Creek
Dupree
Eagle Butte
Faith
Red Elm
Arrowhead
Deer's Ear Butte
Castle Rock Butte
Haystack Buttes
Moreau
Sulphur Cr
Cherry Cr
Artichoke Butte
Fort Bennett
Okobojo
Clifton
Shiloh
Blunt
Medicine Butte
Fort Pierre
Wendte
Van Metre
Stephan
Ree Heights
Valley View
Miller
St. Lawrence
Highmore
Holabird
Roy
Hawley
Sedgwick
Onida
Gettysburg
Ashton
Miranda
Athol
Bryant
Castlewood
Hayti
Clear Lake
Grandt
Torono
Astoria
Bruce
White
Buchanell
Elkton
Ward
Andreau
Flandreau
Egan
Trent
Baltic
Dell Rapids
Colton
Montrose
Humboldt
Brandon
Hartford
Sioux Falls
Canton
Lennox
Davis
Centerville
Beresford
Alcester
Hudson
Akonda
Dalesberg
Nora
Spink
Vermillion
Elkpoint
Jefferson
Laurel
Sioux City
Plainview
Wakefield
Newcastle
Hartington
Crofton
Running Water
Niobrara
Springfield
Greenwood
Tabor
Tyndall
Utica
Avon
Lesterville
Irene
Hanson
Centerpoint
Menno
Olivet
Parkston
Freeman
Marion
Millboro
Bridgewater
Emery
Monroe
Chancellor
Wakonda
Volin
Davis
Lennox
Harrisburg
Worthing
Canton
Lincoln
Union
Meckling
Gayville
Burbank
Wynot
Wausa
Bloomfield
Crofton
Niobrara
Verdigre
Creighton
Pierce
Norfolk
Madison
Battle Creek
Oakdale
Plainview
Elgin
Pilger
Stanton
Wisner
Winside
Wayne
Carroll
Hoskins
Laurel
Concord
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Fairfax
Bonesteel
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Geddes
Delmont
Tripp
Armour
Platte
Mansbridge
Harrison
Academy
Winner
Colome
Rosebud
Gamble
Porcupine
Pine Ridge
Manderson
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Eagle Nest
Oral
Smithwick
Cascade Spgs.
Edgemont
Oelrichs
Eckard
Ardmore
Chadron
Crawford
Hay Springs
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Longpine
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Oelrichs
Eckard
Ardmore
Chadron
Crawford
Hay Springs
Harrison
Agate
Longpine
O'Neill

Southern Bulgaria. See *Eastern Roumelia, Bulgaria.*

Southern Cross, a constellation of the southern hemisphere, composed of four stars, one of which is of the first, and two of the second magnitude; they form an elongated figure, lying parallel to the horizon, nearly at the height of the pole. The largest of the four is the pole-star of the south.

Southernwood. See *Wormwood.*

Southey (sou'*thi*), Robert, an English poet and miscellaneous writer, was the son of a linen-draper of Bristol, where he was born in 1774. He was sent to Westminster School in 1788, and soon gave proof of distinguished talents. He was dismissed, however, in 1792 for a satirical paper on flogging published in a school journal, *The Flagellant*, and shortly afterwards entered Baliol College, Oxford, with the view of studying for the church. For this, however, the ultra-liberal opinions which he had formed were very ill adapted, and he turned his attention to medicine, but soon gave it up also. He left Oxford in 1794, and having formed an acquaintance with Coleridge, they were married on the same day to two sisters in 1795. A quixotic scheme to revive the golden age in America having been abandoned for want of means, Southey, after selling his *Joan of Arc* for £50, sailed for Portugal with his uncle, the chaplain to the English factory at Lisbon. After his return to England he (1798) entered Gray's Inn, with the view of studying law, but never made any progress in it. He again visited the Peninsula in 1801. Previous to this time he had published several poems, including a violent democratic piece entitled *Wat Tyler*. But he had now renounced his democratic opinions, and gone to what many considered an opposite extreme. His first poem which attracted much notice was *Thalaba the Destroyer*, a metrical romance published in 1802. In 1804 he fixed his permanent residence at Greta, near Keswick, in the heart of the English lake district, where he had Wordsworth and Coleridge for neighbors. From this period his intellectual activity was untiring, and he continued for a period of almost forty years to issue annually at least one, and often several works, besides contributing largely to different periodicals. Having lost his first wife, he, in 1839, married Caroline Anne Bowles (1786-1854), herself a writer of some eminence. Soon after he sank into a state of mental imbecility, and died March 21, 1843. In 1807 Southey received a pension from government, and in 1813 was appointed poet-laureate. The University of Oxford conferred on him the degree of LL.D. in 1821, and in 1835 he received an augmentation of his pension. Among his poetical productions may be mentioned — *Joan of Arc; Thalaba; Madoc; The Curse of Kehama; Roderick, the Last of the Goths; a Poet's Pilgrimage to Waterloo;* and a *Vision of Judgment.* Several of his minor pieces show to more advantage than his larger poems. His prose works include *Life of Nelson, History of Brazil*, etc.

South Georgia, a barren snow-covered island in the South Atlantic, 500 miles E. S. E. of the Falkland Islands, to which it is regarded as belonging.

South Hadley, a town of Hampshire Co., Mass., 4 miles N. of Holyoke, on the Connecticut River. Seat of Mount Holyoke College (chartered 1888). It has paper and cotton mills, etc. Pop. (1920) 5527.

Southington (suth'ing-tun), a town and borough of Hartford Co., Conn., 18 miles S. of Hartford. It has manufactures of drop forgings, hardware, tools, etc. Pop. (1920) 8440.

South Kensington Museum, known as the Victoria and Albert Museum, an institution in London, England, originated by Prince Albert in 1852, and under the direction of the Board of Education. It contains a rare collection of decorative and applied art, a gallery of paintings, collection of ivories and enamels, mediæval and modern furniture, etc. New buildings were opened in 1909.

South Kingstown (kingz'ton), county seat of Washington Co., Rhode Island, 23 miles S. of Providence. The Rhode Island State College is here (350 students). It has woolen and worsted mills. Pop. (1920) 5181.

South Milwaukee, a city of Milwaukee Co., Wis., 10 miles S. of Milwaukee. It has manufactures of steam dredges, malleable castings, mineral wool, hardware, etc. Pop. (1920) 7598.

South Mountain, Battle of, fought in the Civil war, Sept. 14, 1862, near Sharpsburg, Maryland. A victory was gained by the Union forces, but their losses were much greater than the Confederates'.

South Norfolk, a town of Norfolk Co., Virginia, 3

miles S. of Norfolk, on the Norfolk & Western R. R. and the Norfolk & Portsmouth Belt Line. Pop. (1920) 7724.

South Orange, a residential village of Essex Co., New Jersey, 4 miles W. of Newark. It is a suburb of Newark and New York and is the home of Seton Hall College (Roman Catholic; founded, 1856; 400 students). Pop. (1920) 7274.

South Pasadena, a city of Los Angeles Co., California, 9 miles N.E. of Los Angeles; noted for its ostrich farms. Pop. (1920) 7652.

South Polar Expeditions, exploring expeditions in the Antarctic regions. The first discovery of land in the proximity of the Antarctic circle was made accidentally in 1599, by Dirk Cherrits, a Dutch navigator, who, in endeavoring to enter Magellan's Straits, was driven southward to lat. 64°, where he discovered the South Shetland Islands. Captain Cook is the first who is known to have sailed within the Antarctic circle. He reached the southernmost point attained by him on January 30, 1774, in 71° 10′ S. and 107° W. In 1821 the Russian Bellinghausen discovered Peter the Great and Alexander Islands. Enderby Land and Kemp Land were discovered by Biscoe in 1831-33. The first of these is the easternmost point of a supposed continuous coast, and lies in lat. about 67° 30′. Sabrina Land and Balleny Islands were discovered in nearly the same latitude by Balleny in 1839. In 1840 two important exploring expeditions, one French, the other American, reached the southern seas. The French expedition, under Dumont d'Urville, found traces of what was believed to be a continuous coast from 136° to 142° E., to which they gave the name of Adélie Land. The American expedition, under Charles Wilkes, passed very near the southern magnetic pole, the position of which at the time he calculated to be lat. 70° S., lon. 140° E., and traced land from lon. 154° 27′ to 97° 30′ E., which he concluded to be continuous. An English expedition under James Clark Ross in 1839 passed the Antarctic circle about lon. 178° E., and in 172° 36′ E. lon. and 70° 41′ S. lat. found a continuous coast trending south, with mountain peaks 9000 to 12,000 feet in height. He gave the country the name of South Victoria Land. In 77° 32′ S. lat., 167° E. lon., he discovered an active volcano, Mount Erebus, 12,400 feet high. Ross reached the farthest south point attained to that time. The Belgiac, under command of Lieut. Adrian de Gerlach, sailed from Antwerp, Belgium, in 1897, to attempt the discovery of the South Pole. Gerlach made important discoveries, but failed in his main object. In 1900 Captain Borchgrevink, heading an English expedition, reached Ross Bay, 78° 35′ S., from which he made a sledging trip over the ice to 78° 50′. Another expedition was sent out in 1901, under Captain Scott, which wintered 400 miles farther south than had ever been done before, and also coasted 150 miles along the ice barrier beyond where Ross had stopped 60 years before. A sledging party ascended a glacier to a height of 9000 feet and saw a level icy plain stretching far southward. The latitude reached was 80° 17′, 670 miles from the pole. In 1908 Lieutenant Shackleton, of the British navy, far surpassed all previous explorers, discovering the south magnetic pole and reaching a point only 111 miles from the south pole. Another British expedition under Captain Scott sailed in early 1911. On January 18, 1912, Captain Scott and four of his men reached the south pole, but perished on the return journey. The previous year, Roald Amundsen, a Norwegian explorer, projected a voyage in the 'Fram' to the Arctic Sea, but instead sailed to the Antarctic, and on December 14, 1911, succeeded in reaching the south pole.

Southport, a watering-place in Lancashire, England, at the mouth of the Ribble. Pop. 51,650.

South Portland, a city of Cumberland Co., Maine, on Casco Bay, opposite Portland. It has government fortifications, State reform school for boys, and steel and iron works, etc. Pop. (1920) 9254.

South River, a borough of Middlesex Co., New Jersey, on South River and on the Raritan River R. R. Pop. 6596.

South St. Paul, a city of Dakota Co., Minn., on Mississippi River, 3 miles from St. Paul. Has meat-packing houses, stockyards, etc. Pop. (1920) 6860.

South Sea Bubble, a disastrous financial speculation which arose in England in the beginning of the eighteenth century. It originated with the directors of a joint-stock company, which, in consideration of certain exclusive privileges of trading to the South Seas, offered the government easier terms for the advance or negotiation of loans than could be obtained from the general public. In 1720 the proposal of the company to take over the entire national debt (at this time about £31,000,000), in consideration of receiving

annually 5 per cent. was accepted, and the company promised in return for this privilege (as it was regarded) a premium in their own stock of £7,500,000. Professing to possess extensive sources of revenue, the directors held out promises to the public of paying as much as 60 per cent. on their shares. It became soon apparent that such magnificent promises could never be fulfilled, and in a few months' time a collapse came which ruined thousands. The directors had been guilty of fraudulent dealings, and the chancellor of the exchequer and others in high positions were implicated.

South Sea Islands. See *Polynesia.*

South Sharon, a borough in Mercer county, Pennsylvania, near Sharon. It has steel, wire, and tin-plate works. Pop. 10,190.

South Shetlands, a group of islands in the Southern Ocean, south of South America, on the Antarctic circle, originally discovered by a Dutch seaman named Dirk Cherrits in 1599. The islands are uninhabited, and covered with snow the greater part of the year.

South Shields. See *Shields.*

Southwark (south'ârk), a division of London south of the Thames, in Surrey, a metropolitan parliamentary borough, directly opposite the city of London.

Southwell (south'wel, suth'l), a city of England, in the county of Nottingham, giving name to a diocese comprising the counties of Notts and Derbyshire, the first bishop of which was appointed in 1884. Its cathedral is an ancient edifice of considerable architectural interest. Pop. (1911) 119,595.

Southworth (south'wurth), EMMA DOROTHY ELIZA, novelist; born in Washington, D. C., in 1818; died June 30, 1899. She was a prolific writer, her first novel, *Retribution*, appearing in 1849. Her novels mostly relate to Southern life, and were widely read, though lacking in literary value.

Souvalky (sö-väl'kē), SUWALKI, a town of Poland. 152 miles N. E. of Warsaw, capital of the government of the same name, with considerable trade, some manufactures, and has a pop. of 33,000.

Souvestre (sö-ves-tr), EMILE, a popular French novelist and dramatist, born at Morlaix, Finistère, in 1806. After editing a liberal paper at Brest for some time he settled in Paris (1836), where he attracted attention by his sketches of Brittany, and was soon recognized as one of the foremost writers of the day. Among his best works are *Les Derniers Bretons*, *L'Homme et l'Argent*, *Confessions d'une Ouvrière*, and *Un Philosophe sous les Toits*. He died in 1854.

Sovereign (sov'rin, sov'e-rin), the person in whom is vested the highest governing power in a monarchy.

Sovereign, a gold coin, the standard of the English coinage. It exchanges for twenty shillings sterling, and has a standard weight of 123-274 grains, being of 22 carats fineness, and coined at the rate of 1869 sovereigns from 40 lbs. troy of gold.

Soviet (sōv'yet), the name given to a group movement in Russia, as distinguished from the Duma, which was the official parliament, and the Zemstvo, the rural common council. The Soviet is a development of the Russian Mir, or mass meeting. (See *Mir.*) It was an unofficial assembly, but following the revolution of 1917, when there was no elected parliament and the reins of government were assumed by a few men of the radical Socialist party, the Bolsheviki (*q. v.*), the Soviet came again into prominence; and the peace treaty with Germany which the Bolsheviki had negotiated was ratified by an all-Russian congress of Soviets held in Moscow in 1918. For this congress one delegate was allowed for every 90,000 population.

Sowbread. See *Cyclamen.*

Sowing-machines (sō'ing), machines for sowing grain. Among the simplest and earliest forms of sowing-machines is a cylindrical vessel with small holes at regular intervals round its circumference for sowing round seed, such as turnip-seed. The machine is placed on wheels, and drawn over the land at a regulated speed, when by its mere revolution the seed is delivered with tolerable uniformity. Another class of machines consists of those having a fixed seed-box, the delivery from which is regulated by internal revolving machinery. The holes for delivery are placed at regular intervals near the bottom of one side of the seed-box. One of the best modes of delivery is that in which the delivery is regulated by cups attached to projecting arms on a revolving disc. The cups dip into the seed and lift successive portions, which they deliver at the height of their revolution into a funnel placed for its removal to the ground. Another mode of delivery is by an oscillating movement given to a false bottom of the seed-box. The real and the false bottom are both

provided with holes, and when the holes correspond the seed falls. An objection is made to these machines that they are liable to cut the seed. In broadcast machines no special apparatus is needed for conveying the seed to the ground, the intervals of the holes causing it to fall evenly on the ground. In the machines called drills the funnel into which the seed is dropped is designed to convey it accurately into the row in which it is to be sown, the rows being parallel to the course of the machine. For this purpose the funnel terminates in a heavy coulter, which opens a channel of uniform depth for the deposit of the seed, which is then covered by a harrow. By further improvements drop drills and dibbling machines have been contrived, which not only deposit the seed in rows but at regular intervals within the rows. The regular delivery of manure is also secured by similar machines.

Sow-thistle, the vulgar name given to a species of a genus of composite plants (*Sonchus*). There are about fifty species, mostly herbaceous, but some forming shrubs or small trees. Some of the first may be considered cosmopolitan, while the woody sorts are almost restricted to the Canaries and the island of Madeira. The best known European species is the common sow-thistle (*Sonchus oleraceus*). It is very abundant as a weed, is greedily fed upon by many animals, and is sometimes used as a pot-herb. The *S. alpinus* forms a tall and fine plant, with fresh and sharply-defined foliage, and large heads of beautiful blue flowers. The *S. arvensis* is found in Massachusetts and Southern New York.

Soy (soi), a dark-colored sauce prepared by the Chinese from the seeds of a sort of bean (*Dolichos soja*). It is made by boiling the seeds until they become soft, and mixing with them an equal weight of wheat or barley meal coarsely ground, a certain proportion of salt and water being added. The seeds are, besides, employed in China and Japan as food.

Soymi'da. See *Redwood.*

Spa, or Spaa (spä), a town of Belgium, in the province of Liége and 16 miles south of the town of Liége. Its chief importance is due to its effervescent, chalybeate, saline, mineral waters, which are much used by visitants on the spot, and also extensively exported. It has long enjoyed celebrity, and has given its name to many mineral springs. There are many fine buildings and numerous attractions for visitors. In the eighteenth century it was the most fashionable resort in Europe. Pop. 7759.

Spaccaforno (späc-ka-for'nō), a town of Sicily, prov. of Syracuse. Near it are some curious prehistoric artificial caves. Pop. 10,617.

Space (spās), in philosophy, extension considered independently of anything which it may contain, extension considered in its own nature. Aristotle defines it as the possibility of motion, and possessing the quality, therefore, of being — potentially, not actually — divisible *ad infinitum*. Space and Time are two of the so-called innate ideas. According to one school these ideas are intuitive to the mind; according to another they are the result of experience. Locke maintained that we acquire the idea of *space* by the senses of sight and touch. Space and Time, according to Kant, are the ultimate forms of external and internal sense, and these forms are contained *a priori* in the human mind. Space is the *form* of external sense by means of which objects are given to us as existent without us, and as existent also apart from and beside one another. If we abstract from all that belongs to the *matter* of sensation (in any perception), there remains behind only space, as the universal form into which all the materials of the external sense dispose themselves. Herbert Spencer, while making no attempt to analyse the notion of space, says: 'It will be sufficient for present purposes to say that we know *space* as an ability to contain bodies. I am aware that this is no definition properly so-called, seeing that as the words, *contain* and *bodies* both imply ideas of space, the definition involves the thing to be defined. But leaving out as irrelevant all considerations of the mode in which we come by our ideas of *space*, and of bodies as occupying *space*, it will, I think, be admitted that the antithesis between bodies and an ability to contain bodies truly represents the contrast in our conceptions of the sensible non-ego (matter) and the insensible non-ego (*space*).'

Spada (spä'dä), Lionello, an Italian painter, Bolognese school, born at Bologna in 1576; died at Parma in 1622. He became the pupil of Caravaggio, with whom he traveled. On his master's death he returned to Bologna, and spent his latter days at the court of the Duke of Parma. Among his works (which are well known in European galleries) *St. Dominic burning the Heretical Books* and an altar-piece in the church of St. Domenico at Bologna, are considered his best.

SPAIN AND PORTUGAL
SCALE OF MILES
0 20 40 60 80
Railroads,
Canals,
BAY OF BISCAY
ATLANTIC OCEAN
MEDITERRANEAN SEA
FRANCE
PORTUGAL
SPAIN
GULF OF CADIZ
GULF OF VALENCIA
BALEARIC ISLANDS
MAJORCA
MINORCA
PITHYUSÆ ISLES.
FORMENTERA
CABRERA
MADRID
LISBON
BARCELONA
VALENCIA
AFRICA
The old provinces of Portugal are subdivided into modern districts, of which the boundaries are shown. Each district bears the name of its capital city, designated thus ⊙
SPAIN
PROVINCES
1 Alava.....E 1
2 Albacete..E 3
3 Alicante...F 3
4 Almeria..E 4
5 Avila......D 2
6 Badajoz...C 3
7 Balearic Islands..H 3
8 Barcelona H 2
9 Burgos....E 1
10 Caceres....C 3
11 Cadiz.....D 4
12 Castellon de la Plana..F 2
13 Ciudad Real E 3
14 Cordova..D 3
15 Coruna...B 1
16 Cuenca....E 2
17 Gerona....H 1
18 Granada..E 4
19 Guadalajara E 2
20 Guipuscoa E 1
21 Huelva....C 4
22 Huesca....F 1
23 Jaen.......E 4
24 Leon.....D 1
25 Lerida....G 2
26 Logrono..E 1
27 Lugo......C 1
28 Madrid....E 2
29 Malaga....D 4
30 Murcia....F 4
31 Navarra...F 1
32 Orense...C 1
33 Oviedo....D 1
34 Palencia..D 1
35 Pontevedra B 1
36 Salamanca C 2
37 Santander E 1
38 Saragossa.F 2
39 Segovia...E 2
40 Seville....D 4
41 Soria......E 2
42 Tarragona G 2
43 Teruel.....F 2
44 Toledo....D 3
45 Valencia..F 3
46 Valladolid D 2
47 Vizcaya....E 1
48 Zamora...D 2
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Spadix (spā'diks), in botany, a form of the inflorescence of plants, in which the flowers are closely arranged round a fleshy radius, and the whole surrounded by a large leaf or bract called a spathe, as in palms and arums.

a, Spathe, and *b*, Spadix of *Arum maculatum*.

Spagnoletto (spán-yo-let'tō; 'little Spaniard'), a celebrated painter, whose true name was Giuseppe Ribera, or Ribeira; born at Xativa, in Valencia, in 1588; died at Naples, in 1656. He was at first a pupil of Caravaggio, but afterwards improved himself by the study of the works of Raphael and Correggio, at Rome and Parma. Settling in Naples he was appointed court painter, in which post he took the leading part in an infamous plot against his rivals Carracci, D'Arpino, Guido, Domenichino, etc. Ribeira excelled in the representation of terrible scenes, such, for example, as the *Flaying of St. Bartholomew*. His works are not uncommon in European galleries.

Spahis (spä'hēz), or SIPA'HIS, the name given to the irregular Turkish cavalry, which is said to have been organized by Amurath I, and which gave place in 1826 to regular cavalry. Their usual arms were the saber, lance, and javelin. The French call a body of light cavalry raised in Algeria by the name of spahis. The name *sepoys* given to the native troops in British India is the same word.

Spain (spān; Spanish, *España*), a country in the southwest of Europe, forming with Portugal the great southwestern peninsula of Europe. It is separated from France on the northeast by the chain of the Pyrenees, and is otherwise bounded by Portugal and the Atlantic and Mediterranean. In greatest breadth N. and S. it measures 540 miles; greatest length E. and W., 620 miles; total area, 194,783 sq. miles; pop. 19,950,817. Besides the Balearic and Canary Islands, which are reckoned European territory, Spain held until 1898 a portion of her once magnificent colonies, including the islands of Cuba and Porto Rico in the West Indies; also the Philippine and some adjacent islands. It now holds only a strip on the west coast of the Sahara, the island of Fernando Po, the Balearic and Canary Islands, and some small possessions on the coast of Morocco. Spain formerly comprised the kingdoms and provinces of New and Old Castile, Leon, Asturias, Galicia, Estremadura, Andalusia, Aragon, Murcia, Valencia, Catalonia, Navarre, and the Basque Provinces. These since 1834, for administrative purposes, have been divided into forty-nine provinces, including the Balearic and Canary Islands. The capital is Madrid; next in population are Barcelona, Valencia, Seville, and Malaga.

Physical Features.—The coast-line is not much broken, but sweeps round in gentle curves, presenting few remarkable headlands or indentations. The interior is considerably diversified, but its characteristic feature is its central tableland, which has an elevation of from 2200 to 2800 feet, and a superficial extent of not less than 90,000 sq. miles. It descends gradually on the west towards Portugal; but on the east, towards the provinces of Catalonia and Valencia, it presents an abrupt steep or line of cliffs, with the character of an ancient sea margin. It is bounded on the N. by the Asturian and Cantabrian Mountains, reaching an elevation of about 8500 feet; on the S. by the Sierra Morena; and is crossed from east to west by the rivers Douro, Tagus, and Guadiana. Between these limits it is intersected by two important ranges of mountains running nearly E. and W., the northern being the Guardarrama with its continuations, separating the valleys of the Douro and Tagus, and attaining in one of its peaks a height of 8200 feet; and the southern, the Sierra de Toledo and its continuations between the Tagus and the Guadiana. South of the Sierra Morena is the valley of the River Guadalquivir. On the northern boundary is the chain of the Pyrenees, which, though partly belonging to France, presents its boldest front to Spain and has its loftiest summits within it. The highest peak in this range is La Maladetta or Pic de Netou (11,165 feet); but the highest peak in Spain is Mulahacem (11,705 feet), belonging to the Sierra Nevada in the far south. The latter chain possesses some of the wildest scenery in Europe. The chief rivers enter the Atlantic, but in the northeast is the Ebro, a tributary of the Mediterranean. The Douro, Tagus, and Guadiana belong partly to Portugal. The lakes are few and unimportant. The whole country teems with mineral wealth, the minerals including in greater or less quantities gold, silver, quicksilver, lead, copper, iron, zinc, calamine, antimony, tin, coal, etc. The exploitation of the minerals has, however, in recent times been mostly ac-

complished by foreign capital, while most of the ore is exported to foreign countries in its raw state.

Climate, Vegetable Products, etc.— The climate varies much in different localities. On the elevated table-land it is both colder in winter and hotter in summer than usual under the same latitude. In the plains and on the coasts the hot summer is followed by a cold rainy season, terminating in April in a beautiful spring. The mean temperature at Malaga in summer is 77° F., in winter 57°; at Barcelona 77° and 50°; and at Madrid 75° and 44.6°. The rainfall is small; in the interior between 8 and 12 inches per annum. In some parts of the south the climate is almost tropical. The hot south wind of Andalusia, known as the *solano*, and the cold north wind called the *gallego*, are peculiar to Spain. About one-sixth of the acreage is under wood; the more remarkable trees being the Spanish chestnut and several varieties of oak, and in particular the cork-oak. Fruits are extremely abundant, and include, in addition to apples, pears, cherries, plums, peaches, and apricots, the almond, date, fig, orange, citron, olive, and pomegranate; and in the lower district of the south, the pineapple and banana. The culture of the vine is general, and great quantities of wine are made, both for home consumption and exportation. The more important farm crops are wheat, rice, maize, barley, and legumes. In the south cotton and the sugar-cane are grown. Hemp and flax, esparto, the mulberry for rearing silk-worms, saffron, licorice, are also to be mentioned. The only large animals in a wild state are the wolf, common in all the mountainous districts, and the bear and chamois, found chiefly in the Pyrenees. Domestic animals include the merino sheep in great numbers, horses, mules, asses, horned cattle, and pigs.

Manufactures, Trade, etc.— The manufactures of Spain are not as a whole important, but considerable advances have been made in recent times. The most important industries are the manufactures of cotton, of woolens and linens, of cutlery and metal goods, paper, silk, leather, tobacco and cigars, besides wine, flour, and oil. The chief articles of export are wine (by far the first), fruits (especially oranges and raisins), cork, lead, iron ore, oils, soap, and agricultural produce (including cattle and wool). The chief trade is with France, next to which is Britain. The country is imperfectly provided with roads; the rivers are of little use for navigation; and though railways have considerable aggregate length, much is still required. The chief denomination of money is the *peseta*, of which 25 are nearly equivalent to $5.

Government, etc.— The present constitution dates from 1876, and enacts that the government be a constitutional monarchy, the legislative power resting 'in the Cortes with the king,' the executive being vested, under the monarch, in a council of nine ministers. The Cortes consists of two independent bodies — the Senate and Congress, the former consisting of 360 members, one-half of whom are elected by corporations and similar bodies, the other half being life senators nominated by the crown, and 'senators by their own right.' The Congress is formed by deputies in the proportion of one to each 50,000 of the population. The various provinces, districts, and communes are governed by their own municipal laws with local administration. Each commune has its affairs directed by an elected *ayuntamiento*, and each province has its *diputacion provincial*, or parliament, whose members are elected by the *ayuntamiento*. The revenue, raised chiefly by direct and indirect taxation, stamp-duties, government monopolies, income from state property, etc., in 1914–15 was estimated at $232,071,000; the expenditure, $216,452,000; while the debt, funded and floating, amounted to $1,817,674,327.

Army and Navy.—The army consists of (1) a permanent army, in which all above the age of twenty are liable to serve for three years; (2) an active reserve with three years' service; and (3) a sedentary reserve, with service for other six years. By the payment of $300 exemption from service may be obtained. For military purposes the country, with the islands, is divided into fourteen districts, and the strength of the army (exclusive of the reserve) is 150,000 in peace and 1,180,000 in war. The navy has been of small importance since the destruction of its chief ships in the war of 1898.

People, Religion, etc.— The people of Spain are of very mixed origin, the most ancient inhabitants, the Iberians (now represented probably by the Basques or Biscayans of the northeast), being afterwards mingled with Celts, Phœnicians, and Carthaginians, Roman colonists, Goths, Jews, and Arabs or Moors. They are generally of medium height and of spare habit, with black hair, dark eyes and sallow complexion. Under the constitution, the state binds itself to maintain the Roman Catholic religion, but a restricted liberty of worship is permitted to Protestants, of whom, however, there

are very few. There are nine archbishops, the Archbishop of Toledo being primate. Houses for monks no longer exist, having been abolished by law in 1841. In 1857 an elaborate scheme of education (including compulsion) was proclaimed by the government, but never enforced; and thus education is in a very backward state. Recently, however, there has been a more efficient supervision, and the number of pupils in the public schools has much increased. There are government schools for engineering, agriculture, fine arts, music, etc., and ten universities.

History.— The most ancient known inhabitants of Spain were the Iberians. To these afterwards were joined certain tribes of Celts, and subsequently the two races united. The Phœnicians made settlements at a very early date, having founded Cadiz about B.C. 1100; later the Greeks founded several cities, and then (B.C. 238) the history of Spain may properly be said to begin with the Carthaginian invasion. Hamilcar Barca undertook, with considerable success, to subjugate the tribes of the Peninsula, and in this effort he was followed by Hasdrubal and Hannibal. War between Rome and Carthage brought the Romans to Spain, and (B.C. 205) ended in their driving out the Carthaginians. (See *Rome* and *Hannibal.*) The Romans then undertook the subjugation of the entire country, but in this they did not completely succeed until after about 200 years. The tribes in the mountains of the north were finally subjugated by Augustus and his generals, and Spain was converted into a Roman province.

In 256 A.D. the country was invaded by the Franks, and after their departure Spain became peaceful until the advent of the Goths. A Visigothic kingdom was established about 418 A.D. But after retaining the mastery of the country for nearly three centuries the Visigoths were in their turn conquered (711 A.D.) by the Saracens under Tarik, and the greater part of Spain became a province of the caliphs of Bagdad. For some years they held it as a dependency of the province of North Africa, but it was afterwards (717) governed by *emirs* appointed by the caliphs of Damascus. Dissensions ultimately arose between the central power and the province, with the result that an independent dynasty was established by Abd al-Rahman at Cordova (756 A.D.), which received additional power and magnificence from Hisham (788) and his son Al Hakam (796). Meanwhile several small independent kingdoms had been formed in the mountainous districts of the Pyrenees, probably by descendants of the Visigoths. The chief of these were the kingdoms of Asturias, Leon, Navarre, Aragon, and Castile. These states were often at war with each other, and in the struggle for supremacy Castile and Aragon ultimately absorbed all the others. The rise of these two powerful Christian states in the eleventh century was contemporary with the decline and disruption of the Ommiade dynasty of the Moslems, and in a struggle between the two religions a famous part was taken by the 'Cid' (which see). It seemed, indeed, at this time as if the Moslem power in Spain was about to be annihilated, but with aid from Africa, and after the death of the Cid, they regained much of their influence. This power was directed at first by the Almoravides, whose caliphs ruled from Morocco, and then by the Almohades, until the latter were defeated (1212 A.D.) in the decisive battle of Las Navas de Tolosa. To the Moors there now remained only the kingdoms of Cordova and Granada, but even these were soon obliged to admit the supremacy of Castile.

By the marriage (1469) of Isabella, the heir to the crown of Castile, with Ferdinand of Aragon, begins the modern history of Spain. The two States thus united retained their own laws, customs, and administration, but their gradual fusion was promoted and largely accomplished by Cardinal Ximenes. To strengthen the central government and curtail the power of the nobility the *Santa Hermandad*, or Holy Brotherhood, was formed (1476) to act as the administrators of justice; the Inquisition was instituted (1481) to promote religious orthodoxy and unity; the Jews were expelled for heterodoxy; and the Moors were completely subjugated by the conquest of Granada (1492) and afterwards expelled, an act which proved of great industrial injury to Spain. In this same year Columbus discovered the West Indies, and the colonial power of Spain, thus begun, was soon greatly extended.

When Ferdinand died in 1516, his daughter Joanna, who had married Philip, son of Maximilian I, succeeded to the kingdom of Aragon, but her son, Charles I, became regent and ultimately king of the whole of Spain. He was also ruler of the Netherlands, which he inherited from his father, and in 1519 he was proclaimed Charles V, emperor of Germany. As the champion of the Catholic Church he successively declared war with the French, the German Protestants, and the Turks. But as the expense of this vast policy overtaxed his own king-

dom, and was only partially met by the wealth acquired by the conquest of Mexico (1518) and Peru (1531), he finally retired to private life, and was succeeded (1556) by his son, Philip II.

The internal policy of this monarch was characterized by a severe absolutism in matters political and religious, an extension of the power of the Inquisition, and a unification of the peninsula by the conquest of Portugal. By his foreign policy he caused a revolt in the Netherlands (which see) and eventually lost the northern provinces; failed to establish the Spanish influence in France; and sustained defeat from England by the destruction of the Invincible Armada, a great naval demonstration against the island kingdom. He was succeeded (1599) by Philip III, who, by expelling all the Moriscos from his kingdom and engaging in the Thirty Years' war, further impoverished the country. Other disasters overtook Spain on the accession of Philip IV (1621), whose haughty centralizing policy, under the minister Olivarez, brought about civil war in Catalonia, Andalusia, and Naples, the loss of Portugal and French-Comté, and the independence of the Netherlands. Under his son, Charles II (1665), a prince who was feeble both in mind and body, the country declined still more, and at his death in 1700 without an heir there began the war of the Spanish Succession. The succession to the throne lay between the Hapsburgs, whose claim was upheld by the Emperor Leopold I, and the Bourbons, whose claim was maintained by Louis XIV. After a prolonged European war (see *Succession wars*) it was agreed by the Treaty of Utrecht (1713) to acknowledge the Bourbon Philip V as king of Spain, on condition that the Netherlands and the Italian provinces should be given to Austria, while England claimed Gibraltar and Minorca.

Under the able administration of Cardinal Alberoni Spain now regained a large part of its power in Europe. This revival was continued under Ferdinand VI, who succeeded to the throne in 1746; but it received its greatest impulse from Charles III (1759), who developed the agricultural and other resources of his country, and broke the power of the Inquisition by banishing the Jesuits (1767).

The full effect of these and other liberal measures was arrested, however, by the accession of Charles IV (1788), whose policy, directed by Gódoy (which see), first brought about a rupture with the French Republic, and then a close alliance with France and a war against the British, resulting in the battle of Trafalgar (1805), when the naval power of Spain was destroyed. Spain received further humiliation by the success of Napoleon, the Treaty of Fontainebleau, and the occupation of the country by French soldiers. The result was an insurrection and the abdication of the king (1808) in favor of his son, Ferdinand VII. But Napoleon, who had his own intentions regarding the Spanish throne, caused the whole Bourbon family to be set aside and gave the crown to Joseph, his brother. The Council of Castile gave at first a reluctant assent to this arrangement, but soon the provinces declared war and the council entered into an alliance with Great Britain. As the result of this popular rising Madrid was taken by the patriot forces, Joseph Bonaparte retreated, and a junta was formed to govern in the name of Ferdinand VII. On the arrival of Napoleon, however, the Spanish army was destroyed, Madrid retaken, Joseph Bonaparte restored, and the relieving British army under Sir John Moore driven back upon Coruña. The Peninsula was saved from complete subjugation only by the arrival of Wellington with a British army in Portugal, and the determined resistance which he offered during several campaigns to Napoleon's generals. In several battles the British army routed the French and advanced into Spain; but it was not until the spring of 1813 that Wellington was able to clear the Peninsula of French soldiers and to fight his way through the Pyrenees into France. In consequence of this success the Bourbon prince, Ferdinand VII, returned and was proclaimed king (1814), but the country made little progress, owing to the absolute and illiberal policy which he adopted.

During the Napoleonic war the South American colonies had asserted their independence, which they subsequently gained; Florida was sold to the United States in 1819; and those colonial losses were aggravated by the despotic rule of a king who dissolved the Cortes, set aside the constitution, and reëstablished the Inquisition. A revolt against this policy took place in 1820 and spread throughout the country, in consequence of which the constitution was reëstablished, the Inquisition abolished, and in 1822 a Cortes with a liberal majority, was elected. This movement for liberty, however, was suppressed by the Holy Alliance (which see), under the sanction of which a French army entered Spain (1823) and remained there for four years, during which the royal absolutism was restored. In 1829 Ferdinand abolished the Salic law by a 'pragmatic sanction,' and as the

result of this his daughter was proclaimed queen, on the death of her father in 1833, under the title of Isabella II.

As this queen was only three years old, her mother, Maria Christina, undertook the regency; but she was opposed by Don Carlos, a brother of the late king, and a serious civil war broke out. The Carlist party achieved considerable success at first, but the civil strife was ultimately brought to an end by the triumph of the royalists (1840) under Espartero and O'Donnell. Notwithstanding this the regent, who found it impossible to control the various factions, retired into France, and Espartero was recognized as regent. In 1843 the young queen was declared of age, and her government was carried on by Narvaez, who had superseded Espartero.

More successful was the revolution of 1868, inspired by misgovernment and headed by Generals Prim and Serrano. The latter entered Madrid in command of the revolutionary troops, and Isabella fled to France. The Cortes still declared in favor of the monarchical form of government, and great difficulty was experienced in finding a prince both able and willing to occupy the vacant throne. It was offered to Leopold of Hohenzollern-Sigmaringen, but the jealousy of France caused Napoleon III to demand the withdrawal of this candidate, and the diplomatic difficulties connected with this matter were the ostensible cause of the Franco-Prussian war. The crown was at length accepted by Amadeus, second son of Victor Emmanuel, and in 1870 he was formally elected king by the Cortes. But the various parties, among which the most active were the Carlists and the federalists, made government difficult, and the king, after three years of strife, resigned his task.

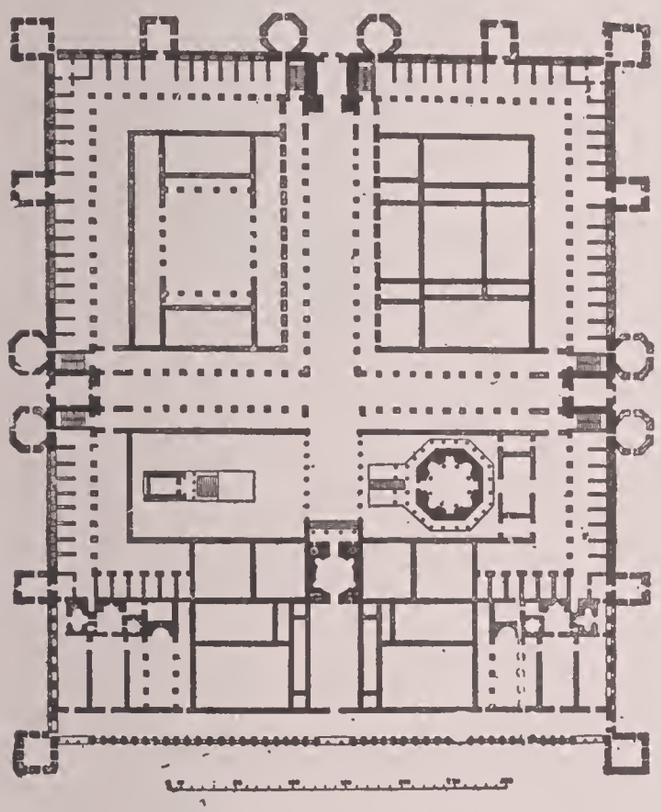
Following this event the Cortes declared in favor of a federal republic (1873), and the presidency was intrusted to Castelar; but the outbreak of a Carlist war in the Basque Provinces and the party complications in the Cortes made this form of government impossible. Accordingly Castelar and his ministry resigned (1874) and the government of the country was undertaken by the chiefs of the revolution of 1868, headed by Marshal Serrano. Under this military administration vigorous measures were taken to suppress the Carlist rebellion; and as it had been proved that a republican form of government was impossible, the throne was offered (1874) to the son of the exiled Isabella. In 1875 the young king, with the title of Alfonso XII. landed at Barcelona, and successfully established his government by a complete defeat of the Carlist insurgents. After this event the country enjoyed comparative quiet until the death of Alfonso in 1885; his wife, Christina of Austria, being proclaimed regent after the birth, in 1886, of her posthumous son, who became king under the title of Alfonso XIII. In April, 1898, war was declared against the United States, the latter claiming that the Spanish rule in Cuba was obnoxious to civilization. It ended most disastrously to Spain, whose forces were defeated in every engagement both ashore and at sea. A peace protocol was signed, August 12, 1898, by which Spain relinquished Cuba and Porto Rico in the West Indies and the Philippine Islands and Guam in the Pacific. During the European war Spain remained neutral.

Language and Literature.— The Spanish language, which is also the language of Mexico and a great part of South America, belongs to the group known as the Romance or Romanic languages. Its formation was influenced by the lengthened duration in Spain of Roman institutions, by the Teutonic element introduced by the Visigoths, and by words of Arabic origin added during the long occupation of the country by the Moors. A number of different dialects developed themselves at an early date, such as the Galician, Catalan, Asturian, etc., but the Castilian took the lead, and came to be considered as the standard of Spanish. The Castilian idiom, which originated in the mountains of the interior of Spain, is characterized by deep and open tones, which now distinguish the Spanish from the Portuguese. The national literature of Spain dates from the twelfth century, ballads and metrical romances being its earliest products. To this period the *Poema del Cid* is usually ascribed, an epic in which are narrated the adventures of Rodrigo Diaz de Bivar, the national hero. Following this early historical and legendary theme came the didactic verse of the Benedictine monk Gonzalo Berceo (1198-1268). To the same period belong two lengthy narrative poems on *Alexander the Great* and *Apollonius of Tyre*, both of which are written in single-rhyme quatrains. But perhaps the most remarkable piece of writing of this age was *Las Siete Partidas* (1265), a Castilian code of laws published under the patronage of Alfonso X; and to this was added the *Libros de Astronomia* and the *Lapidaria*. The most notable of the Spanish poets of the fourteenth century was Juan Ruiz, arch-priest of Hita (1300-51), whose tales, interspersed with song (*cantigas*),

deal with the vices of his countrymen. Of the same burlesque character were the *Rimado de Palacio* of Pedro Lopez de Ayala (1332-1406) the *Proverbios Morales* of Santob the Jew, and a version of the *Dance of Death.* To this century belong the *Crónica de España*, compiled by order of Juan Fernandez de Heredia; and the authors of the prose chronicles of this period include Pedro de Ayala, Fernan de Guzman, Alfonso de Palencia, Fernando del Pulgar, and Andrès Bernaldes. Along with these historical chronicles may be mentioned the biographies of Pedro Nino, Alvara de Luna, Gonzalvo de Córdova, and Ruy Gonsalez de Clavijo. In the sixteenth century there was published the *Amadis de Gaula*, the first of the Spanish *caballerias*, or 'books of chivalry'; and allied to it in character, but published later, were the *Amadis de Grecia*, *Don Florisando*, *Don Florisel de Niquea*, etc. At the court of Juan II (1406-54), in Castile, the *gaya ciencia* of the troubadours was established by Enrique, Marques de Villena, who was himself a translator of Virgil, and whose pupil, Lope de Mendoza, Marques de Santillana, wrote numerous sonnets and *serranillas.* It was not, however, until the kingdoms of Castile and Aragon were united under Ferdinand and Isabella that Spanish literature attained its chief distinction. This classic period, influenced by the Renaissance in Italy, found its first expression in numerous tercets, sonnets, and *cancioncs*, of which the principal writers were Juan Boscan Almogaver, Diego de Mendoza, Garcilaso de la Vega, Fernando de Herrera and Hernando de Acuña. These innovators of the Petrarchian school were opposed by the rhymers of the old Castilian *redondillas*, chief among whom was Cristóbal de Castillejo. But more characteristic of this period was the vigorous development of the *novela*, with a picaroon or rogue for hero. The earlier of these *picaresque* novels was the *Life of Lazarillo de Tormes*, by an unknown author; and this found imitation in the adventures of *Guzman de Alfarache*, by Mateo Aleman; *Alonzo Mozo*, by Geronimo de Alcalá; *Gran Tacaño*, by Quevedo; and numerous other romances. Yet these were all surpassed, and the chivalric extravagance of this period burlesqued to extinction by *Don Quixote* (first part 1605), the masterpiece of Miguel Cervantes de Saavedra. The position in popular favor occupied by the romance was claimed at the end of the sixteenth and beginning of the seventeenth century by the drama. From beginnings in the medieval mystery plays it had developed through quasi-religious and wholly secular plays of an unimportant nature until the time of Lope de Vega (1562-1635). This writer, with his extraordinary fertility in production and facility in the invention of plot, added greatly to the scope and importance of the Spanish drama. Among the chief imitators and successors of Lope were Valez de Guevara, Gabriel Tellez (Tirso de Molina), and Juan Ruiz de Alarcon. But this movement received its full perfection and refinement in the poetical and philosophical dramas of Pedro Calderon de la Barca (1600-81). He also had followers and imitators, among whom may be mentioned Moreto, Solis, and Roxas de Castro. Among the historical writings of this era were the *Historia de España*, by Juan de Mariana; *Guerra de Granada*, by Diego de Mendoza; the *Historia Verdadera de la Conquista de la Nueva España*, by Bernal Diaz del Castillo; and the *Historia de las Indias*, by Bartolomé de las Casas. The mystics were represented by Avila, Santa Tiresa, Ribadeneira, and Molina. With the decline in the greatness of the nation, however, there appeared a decadence in its literature. During the eighteenth century the drama lost all virility, while lyric poetry was largely represented by the artificial extravagances perpetuated by the imitators of Gongora (which see). But with the accession of the Bourbons there was introduced from France an element of revival into Spanish literature which was furthered by the *Poetica* of Ignacio de Luzan, the *Retorica*, of Gregorio de Mayans, and the *Teatro Critico* of Benito Feyjoo. This French element had also its influence upon the poets of the latter half of the eighteenth and beginning of the nineteenth centuries, among whom were Valdes, Cienfuegos, Iriarte, Gonzales, Moratin, de la Rosa, etc.; while the romance was revived in the *Fray Gerundio* of José de Isla, who was also the translator of *Gil Blas.* The romantic movement of France had its Spanish adherents, among whom, as the most notable poets, are to be named Zorrilla, Espronceda, Diaz, Escosura, and Pacheco; the chief classicists being Quintana, Reinoso, Calderon, and Carvajal; while as a satirist, José de Lara (Figaro), and as a dramatist Manuel Breton de Herreros, are worthy of mention. More recently the poets Campoamor, Arce, Becquer, de Trueba, and Aguilera, and the novelists Caballero, Valera, Galdos, de Trueba, Gonzales, and Alarcon have attained a certain distinction.

Spalatro (spä'lä-trō), or SPA'LATO, a seaport of Austria, in

Dalmatia, situated on a bay of the Adriatic, 100 miles southeast of Zara. The whole town was at one time confined within the precincts of the vast palace, covering 8 acres of ground, built by the Emperor Diocletian, and of which many interesting and impressive remains are extant, and most of the buildings



Palace of Diocletian, Spalato.

connected with it have been converted into private houses or public edifices. The manufactures include rosoglio and maraschino. Pop. 27,198.

Spalding (spal'ding), a market town of Lincolnshire, England, situated on the Welland River, 15 miles S. W. of Boston. Pop. 10,309.

Spalding, MARTIN JOHN, archbishop, was born near Lebanon, Marion Co., Kentucky, in 1810. He was ordained priest in the Roman Catholic Church in 1834; in 1844 was appointed vicar-general at Louisville, and in 1848 coadjutor-bishop. He was appointed archbishop of Baltimore in 1864, and died in that city Feb. 7, 1872. He was one of the most learned, active, and influential prelates of his church in the United States, ranked high as a reviewer, and contributed largely to the Roman Catholic literature of the country.

Spallanzani (späl-ån-za'nē), LAZARO, born at Scandiano, Italy, in 1729; died in 1799. In 1768 he was appointed to the chair of natural history at Pavia, and thenceforth devoted himself to experimental research. His writings include *Experiments on Animal Reproduction; Infusory Animalcules; The Phenomena of Circulation; Animal and Vegetable Physics; Travels in the Two Sicilies;* and *The Transpiration of Plants.*

Spandau (spän'dą), a town in Brandenburg, Prussia, at the confluence of the Spree and Havel, about 8 miles N. W. of Berlin. It has now been made a fortress of the first class, and forms an important part in the general defenses of the capital. The citadel, which is situated on an island in the Havel, contains the imperial military treasure of Germany. The town has manufactures of artillery and small-arms, gunpowder, woolen and linen cloth, etc. Spandau received municipal privileges in 1232. Pop. (1910) 84,855.

Spandrel (span'drel), or SPANDRIL, in architecture, the irregular triangular space comprehended between the outer curve or extrados of an arch, a horizontal line drawn from its apex, and a perpendicular line from its springing; also a space on a wall, between the outer mouldings of two arches and a horizontal line, or string-course, above them; likewise between similar moldings and the line of another arch rising above and inclosing the two. In Gothic architecture the spandrels are usually ornamented with tracery, foliage, etc.

s s, Spandrels.

Spangles (spang'glz), metal ornaments, used chiefly for theatrical dresses, and consisting for the most part of thin circular pieces of gilt or silvered tin.

Spaniel (span'yel), the name given to several varieties or breeds of dogs. Their distinguishing characteristics are a rather broad muzzle, remarkably long and full ears, hair plentiful and beautifully waved, particularly that of the ears, tail, and hinder parts of the thighs and legs. The prevailing color is liver and white, sometimes red and white or black and white, and sometimes deep brown, or black on the face and breast, with a tan spot over each eye. The English spaniel is a superior and very pure breed. The King Charles dog is a small variety of the spaniel used as a lapdog. The Maltese dog is also a small species of spaniel. The water-spaniels, large and small, differ from the common spaniel

only in the roughness of their coats, and in uniting the aquatic propensities of the Newfoundland dog with the fine hunting qualities of their own race.

Spanish-American War. See *United States.*

Spanish-broom, a plant of the genus *Spartium*, the *S. junceum*, allied to the common broom, but of more rush-like growth. It has been cultivated in gardens for upwards of 300 years, bearing handsome yellow flowers. A good fiber is obtained from the macerated twigs, which is made into thread, cord, and a coarse sort of cloth in some of the Mediterranean countries.

Spanish-brown, a species of earth used in painting, having a dark reddish-brown color, which depends upon the sesquioxide of iron.

Spanish-elm, an evergreen tree of Mexico and the West Indies, yielding a tough elastic wood of a fine grain (*Cordia gerasacanthus*).

Spanish Fly. See *Cantharides.*

Spanish Language and Literature. See *Spain.*

Spanish Main, the name formerly given to the Atlantic Ocean and coast along the north part of South America, from the Leeward Islands to the Isthmus of Darien.

Spanish Succession, War of the. See *Succession wars.*

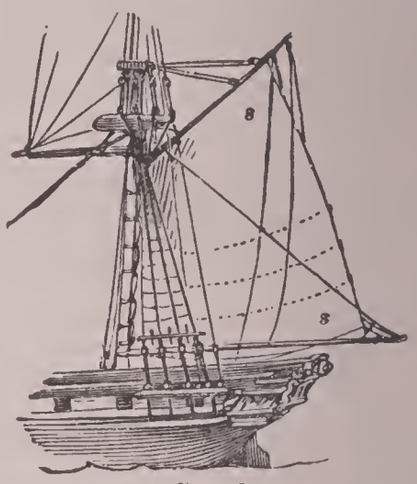
Spanish Town, or Santiago de la Vega, a town of Jamaica, on the south side of the island, about 12 miles northwest of Kingston. It was formerly the seat of government, but that has now been transferred to Kingston. Pop. about 5000.

Spanish-white, originally a white earth from Spain, used in painting; at present, a pigment prepared from chalk which has been separated in an impalpable form by washing.

Spanker (spank'er), a large fore-and-aft sail set upon the mizzen-mast of a ship or barque, the top extended by a gaff, the foot by a boom. It is also called the *mizzen.*

Span-worm, a name frequently given in the United States to certain caterpillars, of which the canker-worm is an example.

Spar, in mineralogy, a term employed to include a great number of crystallized, earthy, and some metallic substances, which easily break into rhomboidal, cubical, or laminated fragments



s s, Spanker.

with polished surfaces, but without regard to the ingredients. Among miners the term is used for any bright crystalline substance.

Spar-deck, nautical, a term somewhat loosely applied, though properly signifying a temporary deck, consisting of spars supported on beams, laid in any part of a vessel. It also is applied to the quarter-deck, gangways, and forecastle of a deep-waisted vessel, and to the upper entire deck of a double-banked vessel without an open waist.

Spargo (spar'gō), John, an Anglo-American socialist, born at Stithians, Cornwall, January 31, 1876; came to America in 1901. His publications include *The Bitter Cry of the Children* (1906), *The Spiritual Significance of Modern Socialism* (1908), and *Syndicalism, Industrial Unionism and Socialism* (1913).

Sparidæ (spar'i-dē), a family of acanthopterygious, teleostean fishes, of which the genus *Sparus* is the type. They somewhat resemble the perches in form, are mostly inhabitants of warm climates. They are edible, and the sheep's-head of the Atlantic coast is very highly prized.

Sparks, Jared, born at Willington, Connecticut, in 1789; died in 1866. He was educated at Harvard, where he became mathematical tutor, and he was subsequently (1819-23) pastor of a Unitarian church at Baltimore. He was afterwards editor of the *North American Review*, and was appointed in 1839 professor of history and in 1849 president of Harvard. He is chiefly known in literature as the author of *Life and Writings of Washington* (twelve

vols., 1834-37); *Diplomatic Correspondence of the American Revolution* (twelve vols., 1829-30); *Library of American Biography* (two series, 25 vols.); and *Works of Benjamin Franklin* (ten vols., 1836-40).

Sparrow (spar'ō), a well-known bird of the finch family (*Passer* or *Pyrgita domestica*), which inhabits the British Islands and other parts of Europe, and has been introduced into North America and Australia. In the United States it is a familiar inmate of the cities, and by its pugnacity more desirable birds have been driven out. The amazing fecundity, strong attachment to their young, familiarity, not to say impudence, and voracity of the sparrows are familiar to all. They often do great injury in cornfields and gardens, but they also do great service in destroying grubs, caterpillars, etc. The tree sparrow (*P. montāna*), the only other British species, is also very widely distributed. It very closely resembles the common sparrow, but is of smaller size. For the hedge-sparrow, see *Hedge Warbler*. Certain members of the family Emberizidæ or buntings, are called 'sparrows' in America.

Sparrow-hawk, the common name of several hawks, a well known European species being the *Accipiter nisus*, or *Nisus fringillarius*, about 12 inches in length. It is a bold, active bird, very destructive to pigeons and small birds. The sparrow-hawk of Australia (*A. torquātus*) is marked by a collar of numerous bars of white. Its habits are very similar to those of the European sparrow-hawk. The American sparrow-hawk is the *Falco sparverius*. It is similar in size to the European sparrow-hawk, but rather allied to the kestrel. It often preys on the chickens in poultry-yards.

Sparrow-hawk (*Accipiter nisus*).

Sparta (spär'tå), or LACEDÆMON (now *Sparti*), a celebrated city of ancient Greece, the capital of Laconia and of the Spartan state, and the chief city in the Peloponnesus, lay on the west bank of the river Eurotas, and embraced a circuit of 6 miles. Sparta was a scattered city consisting of five separate quarters. Unlike Athens it was plainly built, and had few notable public buildings; consequently there are no imposing ruins to be seen here as in Athens, and the modern Sparta is only a village of some 4000 inhabitants. LACONIA, the district in which Sparta was situated, was the southeastern division of the Peloponnesus, bounded on the west by Messenia, from which it was separated by the chain of Taygetus, on the north by Arcadia and Argolis, and on the east and south by the sea. The Eurotas (Vasilopotamo, 'king of rivers') here flows through a picturesque valley and empties into the Gulf of Laconia. The Spartan state was founded, according to tradition, by Lacedæmon, son of Zeus. The most celebrated of its legendary kings was Menelaus. It is said to have been conquered by the Heraclidæ from Northern Greece about 1080, who established a dyarchy or double dynasty of two kings in Sparta. Apart from this legend, it is accepted as a historical fact that the Spartans were the descendants of the Dorians who invaded the Peloponnesus about that period, and that from an early period they followed a set of rigorous laws which they ascribed to Lycurgus. Shortly after their settlement in the Peloponnesus it is probable that the Spartans extended their sway over all the territory of Laconia, a portion of the inhabitants of which they reduced to the condition of slaves (Helots). They also waged war with the Messenians, the Arcadians, and the Argives, against whom they were so successful that before the close of the sixth century B.C. they were recognized as the leading people in all Greece. Early in the following century began the Persian wars, in which a rivalry grew up between Athens and Sparta. This rivalry led to the Peloponnesian war, in which Athens was humiliated and the old ascendency of Sparta regained. (See *Greece.*) Soon after this the Spartans became involved in a war with Persia, by joining Cyrus the Younger in his rebellion against his brother Artaxerxes Mnemon (401), but Athens, Thebes, Corinth, and some of the Peloponnesian states, took this opportunity to declare war against the Lacedæmonians. The latter defeated the Thebans at Coronæa (394); but, on the other hand, the Athenian commander Conon gained a victory over the Spartan fleet at Cnidus. This war, known as the Bœotian or Corinthian war, lasted eight years, and increased the reputation and power of Athens. To break the alli-

ance of Athens with Persia, Sparta, in 387 B.C., concluded with the latter power the peace known by the name of Antalcidas; and the designs of Sparta became apparent when she occupied, without provocation, the city of Thebes, and introduced an aristocratical constitution there. Pelopidas delivered Thebes, and the celebrated Theban war (378-363) followed, in which Sparta was much enfeebled. During the following century Sparta steadily declined, although one or two isolated attempts were made to restore its former greatness. The principal of these was made by Cleomenes (236-222), but his endeavors failed, because there were then scarcely 700 of Spartan descent, and the majority of these were in a state of beggary. With the rest of Greece, Sparta passed under the dominion of the Romans in 146 B.C.

The Spartans differed from the other Greeks in manners, customs, and constitution. Their kings (two of whom always reigned at once) ruled only through the popular will, acting as umpires in disputes, and commanding the army. The Spartans proper, that is, the descendants of the Dorians, occupying themselves with war and the chase, left all ordinary labor to the Helots, while the class known as Perioeci, (descendants of the ancient inhabitants of the country) engaged in commerce, navigation, and manufactures. The distinguished traits of the Spartans were severity, resolution, and perseverance, but they were also accounted faithless and crafty. When a child was born, if it proved vigorous and sound the state received it into the number of citizens, otherwise it was thrown into a cave on Mount Taygetus. To accustom the children to endure hunger they gave them but little food; if they stood in need of more they were obliged to steal it; and if discovered, they were severely punished. They wore no outer garment except in bad weather, no shoes at any time, and they were obliged to make their beds of rushes from the Eurotas. The principal object of attention during the periods of boyhood and youth was physical education, which consisted in running, leaping, throwing the discus, wrestling, etc.

Spartacus (spar'ta-kus), a political party in Germany, similar to the Bolsheviki (q. v.) of Russia, its platform being extreme socialism. Karl Liebknecht created the Spartacus group in 1915. The name is taken from the famous gladiator (see following article), who armed the slaves against the power of Rome and died gallantly in battle. Following the military defeat of Germany and the abdication of Kaiser William II, in November, 1918, the Spartacus group, called also 'Spartacides,' endeavored to take control. The more conservative socialists, led by Friedrich Ebert, opposed the extremists successfully and gained control of the government at the January, 1919, elections. Liebknecht was assassinated. See *Assassinations*.

Spartacus (spär'ta-kus), a Thracian gladiator, the instigator and leader in a revolt of the slaves in Italy (the Servile war) in 73-71 B.C. He had been compelled, like other barbarians, to serve in the Roman army, from which he had deserted. Being made prisoner Spartacus was sold as a slave, and placed in a gladiatorial school at Capua with 200 other Thracian, German, and Gaulish slaves. There they formed a conspiracy and effected their escape; and being joined by the disaffected slaves and peasantry of the neighborhood, in a few months Spartacus found himself at the head of 60,000 men. Two consuls were now sent with armies against him, but Spartacus defeated them in succession and led his elated forces towards Rome. In this crisis Licinius Crassus, who was afterwards a triumvir, was placed at the head of the army, and managed to hem in the revolted slaves near Rhegium. Spartacus broke through the enemy by night, and retreated, but later had to encounter the army of Crassus. His soldiers were overcome and Spartacus himself fell fighting.

Spartanburg (spär'tan-burg), a city, county seat of Spartanburg Co., South Carolina, 93 miles N. W. of Columbia, on the Southern and other railroads. It is one of the great cotton mill centers of the country, with a total of 850,000 spindles. It is the home of South Atlantic States Music Fesival; also noted as an educational center, having Converse College for Women (358 students), Wofford College for Men (285 students) and other schools. Camp Wadsworth was established here during the European war. Pop. (1910) 17,517; (1920) 22,638.

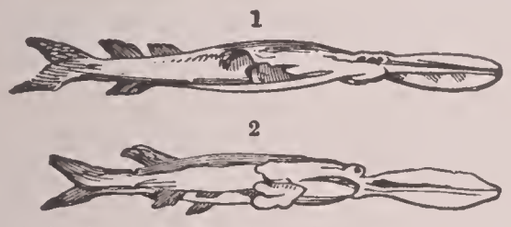
Spasm, in medicine, an abnormal, sudden, and more or less violent contraction of one or more muscles or muscular fibers. Spasm is either *clonic* or *tonic*. In *clonic spasm* the muscles or muscular fibers contract and relax alternately in very quick succession, producing the appearance of agitation, as in epilepsy. In *tonic spasm* the muscles or muscular fibers contract in a steady and uniform manner, and remain contracted for a comparatively long time, as in tetanus.

Spatangus (spa-tan'gus), a genus of sea-urchins, otherwise called 'heart-urchins' from their shape. The species are numerous.

Spathe (spāth), in botany, a large membranaceous bract situated at the base of a spadix, which it incloses as a sheath. It is seen in the greatest perfection in the palms and arums. See *Spadix*.

Spatula (spat'ū-la), a flat sort of knife with a thin flexible blade, used by druggists, painters, etc., for spreading plasters, working pigments, etc. In surgery, it is a flat instrument, angular or straight, for depressing the tongue and keeping it out of the way in operations about the throat or larynx.

Spatularia (spat-ū-lā'ri-a), or POLYODON, a genus of fishes belonging to the sturgeon tribe. They are remarkable for the form of their snouts,



Spatularia, upper (1) and under (2) view.

which are enormously long and leaf-like in form. The type of the genus is the paddle-fish of the Mississippi.

Spavin (spav'in), a disease of horses, affecting the hock-joint, or joint of the hind leg, between the knee and the fetlock. It occurs in two forms. In the first, which is called bog or blood spavin, the joint is distended by joint-oil (synovia). In the other form there is a morbid deposition of bony substance, such as to unite separate bones.

Spawn (spạn), the eggs or ova of fishes, frogs, etc., from which, when fertilized by the males, a new progeny arises that continues the species. In the oviparous fishes with distinct sexes the eggs are impregnated externally, and arrive at maturity without the aid of the mother. The spawn being deposited by the female, the male then pours upon it the impregnating fluid. In the ovoviviparous fishes sexual intercourse takes place, and the eggs are hatched in the uterus. Fishes exhibit a great variety in regard to the number of their eggs. In the spawn of a cod-fish, for example, no fewer than three and a half millions of eggs have been found. In general, before spawning, fish forsake the deep water and approach the shore, and some fish leave the salt water and ascend the rivers before spawning, and then return again. See *Reproduction*.

Speaker (spē'kėr), a person who presides over a deliberative assembly, preserving order and regulating the debates. In both the United States House of Representatives and the British House of Commons the speaker is a member elected to act as chairman or president, in putting questions, reading bills, keeping order, controlling the debates of the house, etc. He does not speak upon any question, or give his vote, except in a committee or in case of an equality of votes, when he gives the casting vote. The lord chancellor is speaker of the House of Lords *ex officio*, and the Vice President of the United States presides over the Senate. The speaker of the United States House of Representatives appoints all committees; he exercises the absolute power of recognition of any one among members rising to debate the question before the House. This has long given the speaker a controlling power over legislation, but in 1910 measures were adopted by the House which considerably restricted his arbitrary power.

Speaking Trumpet, an instrument used for conveying the sound of the voice to a distance. It consists of a hollow piece of metal, or other material, of a nearly conical form, open at both ends, and slightly turned out at the narrow end to form a mouthpiece.

Spear (spēr), a long pointed weapon used in war and hunting, by thrusting or throwing; a lance. See *Lance, Pike*.

Spearmint (spēr'mint; *Mentha viridis*), a species of mint found in the United States and Europe and often cultivated for making sauce and in order to obtain a flavoring essence from it.

Spear-thistle, a common thistle, the *Cirsium lanceolatum*. It grows on waysides and in pastures. The leaves are downy beneath, and their points long and very sharp, and it has handsome heads of purple flowers.

Spearwort (spēr'wurt), a plant of the genus *Ranuncŭlus*. The great spearwort is the *R. lingua*, and the lesser spearwort is the *R. flammula*. The latter is an American plant, with lanceolate undivided leaves and yellow flowers, and is found growing in wet localities.

Special Case, a statement of facts agreed to on behalf of two or more litigant parties, and submitted for the opinion of a court of jus-

tice as to the law bearing on the facts so stated.

Special Pleader, a member of one of the British Inns of Court whose professional occupation it is to give opinions on matters submitted to him, and to draw pleadings and such practical proceedings as may be out of the usual course.

Specialty Debt, in common law, a debt secured by deed distinguished from a simple contract debt.

Species (spē'shēz), as ordinarily defined, is any one group of animals or plants the members of which bear a close resemblance to each other in the more essential features of their organization, which produce fertile progeny, and which while they may produce individuals varying from the general type of the group, the variation is in all cases of a limited kind. Under this definition the various species or kinds of animals and plants, and their included varieties, used to be comprehended, while naturalists regarded species as unchanging throughout the longest succession of ages, except within narrow and marked limits. Thus Buffon defines a species as 'a constant succession of individuals similar to and capable of reproducing each other'; and Cuvier as 'a succession of individuals which reproduces and perpetuates itself.' Since the publication, however, of Darwin's *Origin of Species* this conception has been greatly modified by the view that, as Haeckel defines it, 'the species is the whole succession of organisms which exhibit the same form in the same environment.' In this conception no absolute standard of what constitutes a species can be set up, nor can the number of species, especially among the transitional varieties of the lowest forms of life, be determined. In mineralogy, chemistry, and such sciences as relate to inorganic substances, species is regarded by some writers as being determined by identity of physical properties, as specific gravity, hardness, etc.; and by others, as constituted by chemical composition, the physical properties going for nothing. In scientific classification species unite to form groups called genera, which are included in orders, the orders forming classes, and so on.— Species in logic is a group of individuals agreeing in common attributes and designated by a common name; a conception subordinated to another conception, called a genus or generic conception, from which it differs in containing or comprehending more attributes, and extending to fewer individuals; thus in logic 'man' is a *species* under 'animal' as a *genus*, and 'man' in its turn may be regarded as a *genus* with respect to European, Asiatic, and the like.

Specific Gravity, is the relative gravity or weight of any body or substance considered with regard to an equal bulk of some other body which is assumed as a standard of comparison. The standard for the specific gravities of solids and liquids is pure distilled water at the temperature of 62° Fahr., which is reckoned unity. By comparing the weights of equal bulks of other bodies with this standard we obtain their specific gravities. Thus the specific gravity of cast-iron is 7.21; that is, any particular mass of cast-iron will weigh 7.21 times as much as an equal bulk of water. The practical rule is to weigh the body in air, then in pure distilled water; the weight in air divided by the loss of weight in water will give the specific gravity of the body. In designating the specific gravities of gases the standard of unity is atmospheric air. See *Hydrometer.*

Specific Heat is a term applied to the quantity of heat required to raise equal weights of different substances through equal intervals of temperature. Water is taken as the standard substance in measuring quantities of heat. The thermal capacity of unit mass of cold water is unity, and the number which denotes the thermal capacity of a body expresses the mass of water which has the same thermal capacity as the body. Thus the thermal capacity of unit mass of a substance is called its *specific heat*, and is identical with the ratio of the thermal capacity of any mass of substance to that of an equal mass of water. The specific heats of the metals and of many other substances have been carefully determined, and are tabulated in all the larger books on heat.

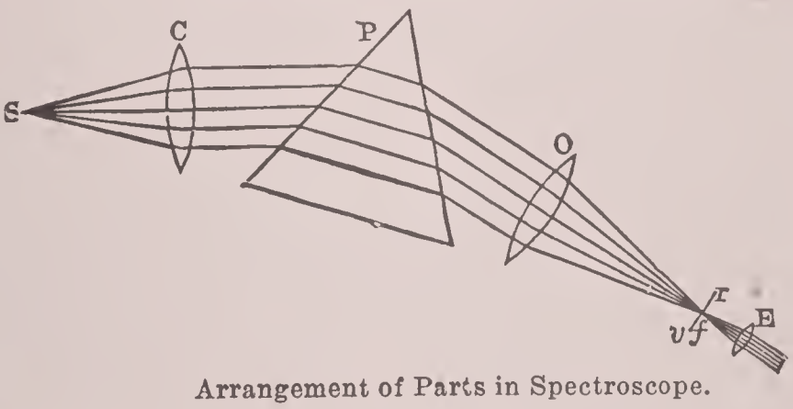
Spectacled Bear (*Tremarctos ornātus*), the sole representative of the bears in South America, inhabiting the high mountain forests of Chile and Peru. It is so-called from the light-colored rings round the eyes having exactly the appearance of a pair of spectacles; the rest of the face and body being black.

Spectacles (spek'ta-klz), a well-known and invaluable optical instrument supposed to have been invented by Roger Bacon in the thirteenth century, and used to assist or correct some defect in the organs of vision. Spectacles consist generally of two oval or circular lenses mounted in a light

metal frame which is made up of the 'bows,' 'bridge,' and 'sides.' The lenses are usually bi-concave, bi-convex, or concavo-convex, though lenses forming segments of a cylinder are used in some cases of astigmatism. In long-sighted persons the defect of the eye is counteracted by convex lenses, in short-sighted persons by concave lenses. (See *Sight.*) *Divided* or *bi-focal spectacles* have each lens composed of two semicircles of different foci neatly united one above the other; one half for looking at distant objects, and the other for examining things near the eye. Another kind, called *periscopic spectacles*, has been contrived in order to allow considerable latitude of motion to the eyes without fatigue. The lenses employed in this case are either of a meniscus or concavo-convex form, the concave side being turned to the eye.

Specter-bats (Phyllostomidæ), a family of insectivorous Cheiroptera, which have a simple and fleshy leaf-like appendage to the nose, and a forefinger of two joints. They attain to a considerable size, and the family comprises the vampire-bats (which see).

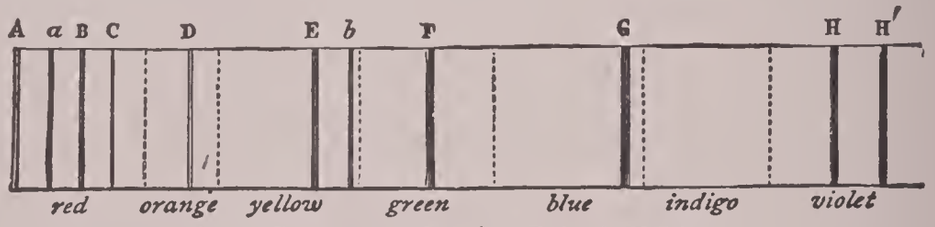
Spectroscope (spek'tru-skōp), the instrument employed in spectrum analysis. (See *Spectrum.*) It usually consists of the following parts: 1st, a tube with a narrow slit at one end, and a convex lens at the other, from which parallel rays of light proceed when light is made to pass through the slit, the two forming together what is called the *collimator*. 2d. A prism of dense flint-glass on which the rays fall after emerging from the collimator. 3d. An observing telescope so placed that the rays traverse it after emerging from the prism. The accompanying figure gives a ground plan of the arrangement; S is the slit, C the collimating lens, P the prism, O the object-glass of the telescope, and E the eye-piece. An image of the slit will be formed at *f* by rays of given refrangibility, others between *f* and *v* by rays of greater refrangibility, and others between *f* and *r* by rays of less refrangibility. These differently refracted rays yield a complete spectrum.



Arrangement of Parts in Spectroscope.

Spectrum (spek'trum), the oblong figure or stripe formed on a wall or screen by a beam of light, as of the sun, received through a narrow slit and passed through a prism, being thus decomposed or separated into its constituent rays. (See *Light.*) This stripe is colored throughout its length, the colors shading insensibly into one another from red at the one end, through orange, yellow, green, blue, indigo, to violet at the other. These colors are due to the different constituents of which solar light is made up, and the stripe seen is formed by an indefinite number of images of the slit ranged in order and partially overlapping. The analysis or decomposition of the beam is due to the different refrangibilities of the component rays, the violet being the most refrangible and the red the least. Besides the colored rays, the spectrum contains thermal or heating rays, and chemical or actinic rays which are not visible to the eye. The heating effect of the solar spectrum increases in going from the violet to the red, and still continues to increase for a certain distance beyond the visible spectrum at the red end, while the chemical action is very faint in the red, strong in the blue and violet, and sensible to a considerable distance beyond the violet end. The actinic rays beyond the violet may be rendered visible by throwing them upon a surface treated with some fluorescent substance. A pure spectrum of solar light is crossed at right angles by numerous dark lines, called *Fraunhofer's lines*, each dark line being invariable in position. The figure shows the positions of the most conspicuous of these fixed lines, and the letters above them are the names by which they are known, being those assigned to them by the discoverer Fraunhofer. For the proper understanding of the import of these lines, five principles require to be kept in view. *First*, an incandescent solid or liquid body gives out a *continuous* spectrum. *Second*, an incandescent gaseous body gives out a *discontinuous* spectrum, consisting of bright lines. *Third*, each element when in the state of an incandescent gas gives out lines peculiar to itself. *Fourth*, if the light of an incandescent solid or liquid passes through

a gaseous body, certain of its rays are absorbed, and black lines in the spectrum indicate the nature of the substance which absorbed the ray. *Fifth*, each element, when gaseous and incandescent, emits bright rays identical in color and position on the spectrum with those which it absorbs from light transmitted through it. The spectrum of sodium, for instance, shows two bright lines which correspond in position with the double black line at D (the *sodium line*) shown in figure. Now, applying these principles to the solar spectrum, we find, from the nature and position of the rays absorbed, that its light passes through hydrogen, potassium, sodium, calcium, barium, magnesium, zinc, iron, chromium, cobalt, nickel, copper, and manganese, all in a state of gas, and constituting part of the solar envelope, whence we conclude that these bodies are present in the substance of the sun itself, from which they have been volatilized by heat. The moon and planets have spectra like that of the sun, because they shine by its reflected light, while, on the other hand, each fixed star has a spectrum peculiar to itself. It has been already said that the incandescent vapor of each elementary substance has a characteristic spectrum, consisting of fixed lines, which never changes. This furnishes the chemist with a test of an exquisitely delicate nature for the detection of the presence of very minute quantities of elementary bodies. Thus, by heating any substance till it becomes gaseous and incandescent and then taking its spectrum, he is able by the lines to read off, as it were, from the spectrum, the various elements present in the vapor. Several new elements, as rubidium, cæsium, indium, and thallium, have thus been detected. See *Spectroscope*.



Solar Spectrum, showing Principal Lines.

Spectrum Analysis. See *Spectrum*.

Speculum (spek′ū-lum), in optics and astronomy, a reflecting surface, such as is used in reflecting telescopes, usually made of an alloy of copper and tin (see *Speculum Metal* below), but frequently now of glass. Those of glass are covered with a film of silver on the side turned toward the object, and must not be confounded with mirrors, which are coated with tin-amalgam on the posterior side.— In surgery the name is given to an instrument used for dilating any passage, as the ear, or parts about the uterus, with a reflecting body at the end, upon which a light being thrown the condition of the parts is shown.

Speculum Metal, metal used for making the specula of reflecting telescopes. It is an alloy of two parts of copper and one of tin, its whiteness being improved by the addition of a little arsenic.

Spedding (sped′ing), James, born near Bassenthwaite, in Cumberland, in 1810; died from the effects of a cab accident in 1881. He was educated at Bury St. Edmunds and Trinity College, Cambridge, was graduated in 1831, and was long an honorary fellow of his college. In 1847 he undertook, with the collaboration of Mr. R. L. Ellis and Mr. D. D. Heath, to prepare a complete edition of Bacon's works; but the former died while the task was unfinished, and the latter only gave occasional assistance. The work, therefore, was almost entirely left to Spedding, who completed and published his labors in seven volumes (1857-61). This done, he published *The Life and Letters of Bacon* (seven vols., 1862-74), and *Reviews and Discussions, Literary, Political, and Philosophical; Evenings with a Reviewer*, and *Studies in English History*.

Speech (spēch), spoken language; uttered sounds intended to convey meaning, and produced by the organs of voice, namely, the larynx, and the mouth and its parts, including the tongue and teeth. In speech two great classes of sounds are produced, these being usually known as *vowels* and *consonants*. Vowels are pronounced by sounds coming primarily from the larynx and passing with comparative freedom through the mouth cavity, though modified in certain ways; while consonants are formed by sounds caused by the greater or less interruption of the current of air from the larynx in the mouth. Vowels can be uttered alone and independently of consonants, and their

sounds can be prolonged at will; consonants have no importance in speech as apart from vowels, and are named consonants from being used along with vowels. Both vowel and consonant sounds are very numerous if we investigate the different languages of the world, but any one language only has a fraction of those that may be used. A single sound may convey an idea of itself and thus form a word, or several may be combined to form a word, and if the word is uttered by several distinct successive changes in position of the vocal organs it is a word of so many syllables. Words, again, are combined to form sentences or complete statements, and the aggregate of words used by any people or community in mutual intercourse forms its language. See *Philology*, *Voice*, *Vowel*, *Consonant*, etc.

Speech, Visible, the reading of spoken utterances by watching the motion of the lips, larynx, etc., of a speaker, has been scientifically studied for years past and is now taught to the deaf with striking success. This system has definitely replaced the old finger-sign alphabet of the deaf, on which it is a vast improvement.

Speedwell (spēd'wel), the common name of plants of the genus *Veronica*, nat. order Scrophulariaceæ, natives of temperate climates all

Germander Speedwell (*Veronica Chamædrys*).

over the world. The species consist of herbs, undershrubs, or shrubs, with opposite, alternate, or verticillate leaves. The flowers are of a blue, white, or red color, having two stamens, and are arranged in axillary or terminal spikes or racemes. *V. Virginiea* has a white corolla. *V. officinălis*, or common speedwell, was once extensively used as a substitute for tea, and also as a tonic and diuretic. *V. Teuerium*, or germander-leaved speedwell, has much the same properties as common speedwell, and *V. Chamædrys*, or germander speedwell, is a very general favorite, on account of its being among the very first that opens its flowers in the early spring.

Speke (spēk), John Hanning, an English traveler, born in 1827; died from a gun-shot accident, in 1864. In 1844 he obtained a commission in the 46th Regiment of Bengal Native Infantry, and took part in the war of the Punjab. In 1854 he accompanied Burton's party in their expedition to Somali Land, and was wounded in that disastrous affair. In 1857 Speke and Burton again set out, directed by the Royal Geographical Society, their object being to ascertain the position of the great lakes of the interior. The great lake Tanganyika was discovered, and Burton falling sick, Speke proceeded north and discovered the south end of the Victoria Nyanza. For this discovery he was awarded the gold medal of the Royal Geographical Society. In 1862, accompanied by Captain Grant, he explored the western and northern margin of the lake, and found a river flowing north and out of the lake, which proved to be the White Nile. His discoveries and adventures were described by him in his *Journal of the Discovery of the Sources of the Nile* (1863) and *What Led to the Discovery of the Sources of the Nile* (1864).

Spelt, a hard-grained variety of wheat (*Tritieum spelta*) grown in elevated localities in Germany and elsewhere in Europe. *Emmer*, a similar and hardier variety (called also 'spelt'), is grown in the United States. Spelt was cultivated in ancient Egypt.

Spelter, a name often applied in commerce to zinc.

Spence (spens), William, an English naturalist, born in 1783; died in 1860. The observation of the habits of animals, more especially insects, early formed a favorite pursuit with him. Having made the acquaintance of the distinguished entomologist, Mr. Kirby, the result was the joint production of the well-known *Popular Introduction to Entomology*. The first volume of this work appeared in 1815, and it was subsequently completed in four volumes in 1826. Mr. Spence was at one time in business at Hull; later he resided in London.

Spencer (spen'ser), George John, Earl, son of the first Earl Spencer, was born in 1758; died in

1834. He was educated at Harrow, and Trinity College, Cambridge. When he had completed his education he traveled, and on his return was elected member of parliament for the county of Northampton. In 1789, by his father's death, he became Earl Spencer. In the House of Lords he voted with the Whigs till the period of the French revolution, when he joined the party of Pitt, and was for some time a member of the Pitt administration. Earl Spencer was president of the Roxburghe Club at its origination, and possessed the largest and richest private library in the world. A catalogue of the rarest and most costly works of the collection was prepared by Dibdin — *Bibliotheca Spenceriana, or a Descriptive Catalogue of the Books Printed in the Fifteenth Century, and of Many Valuable First Editions* (four vols., 1814).

Spencer, Herbert, an English philosopher, born at Derby, April 27, 1820; was educated by his father, a teacher of mathematics, and his uncle, a clergyman; was apprenticed as a civil engineer, and worked several years on railways; contributed several professional papers to the *Civil Engineer and Architect's Journal*, besides a series of letters in 1842, on *The Proper Sphere of Government*, to the *Nonconformist;* became in 1848 subeditor of the *Economist;* published *Social Statics* (1851), and *Principles of Psychology* (1855). About the year 1859 he projected a complete scheme of philosophy, based on the principle of evolution in its relation to life, mind, society, and morals. This ambitious and extensive scheme was fulfilled as follows: — *First Principles* (1862); *Principles of Biology* (1867); *Principles of Psychology* (1872); *Principles of Sociology* (1877); *Ceremonial Institutions* (1879); *Political Institutions* (1882); *Ecclesiastical Institutions* (1885), these latter being parts of his *Principles of Sociology; Principles of Ethics* (1893). His other works include *Education* (1861); *Essays: Scientific, Political, and Speculative* (1858-63); *Classification of the Sciences* (1864); *The Study of Sociology* (1873); and *Man versus the State* (1884). Besides his own work he published eight parts of an elaborate *Descriptive Sociology* compiled by other writers, but classified and arranged by himself. Spencer is regarded as one of the most profound thinkers of the present age, and his works have had a great influence upon recent scientific and philosophic thoughts. He died December 8, 1903.

Spencer, a city of Worcester Co., Massachusetts, about 12 miles w. of Worcester. Its principal industry is the manufacture of boots and shoes, one of its factories being very large. Woolens, satinet, wire, etc., are also manufactured. Pop. 5930.

Spencer Gulf, an extensive inlet of South Australia; length about 200 miles, breadth at widest about 90 miles, and at inner extremity about 3 miles.

Spener (spā'ner), Philipp Jakob, a German Lutheran divine, born in 1635; died in 1705. In 1651 he commenced his theological studies at Strasburg, became in 1654 tutor to the Princess of the Palatinate, and delivered lectures on philosophy and history. In 1664 he was made doctor of theology at Strasburg, and in 1666 he received the office of senior clergyman at Frankfort-on-the-Main. In 1670 he instituted his celebrated *collegia pietatis*, which, against his will, became the origin of *pietism*. From 1686 to 1691 he was preacher to the court in Dresden. He went in 1691 to Berlin, and he took an active part in the foundation of the University of Halle. See *Pietism*.

Spenser (spen'ser), Edmund, a distinguished English poet, was born in London about 1553, and was probably descended from the Spensers of Hurstwood, Lancashire. He was admitted as a sizar of Pembroke Hall, Cambridge, on May 20, 1569, was graduated as B.A. in 1573, and as M.A. in 1576. On leaving the university he is thought to have resided in the north of England, where he unsuccessfully wooed a lady whom he celebrates under the name of Rosalinde in his *Shepherd's Calendar*, published in 1579. The year before he had gone to London, where he was introduced to Sir Philip Sidney, to whom he dedicated this poem. In 1580 he was appointed, through the influence of Sidney, secretary to Lord Grey de Wilton, lord-lieutenant of Ireland, and became clerk of degrees and recognizances in the Irish Court of Chancery. In 1586 Lord Grey, in conjunction with the Earl of Leicester and Sir Philip Sidney, procured for him a grant upwards of 3000 acres in the county of Cork, out of the forfeited lands of the Earl of Desmond. He accordingly fixed his residence at Kilcolman, in the county of Cork, about 1588, in which year he resigned his clerkship in the Court of Chancery. In 1588 he was appointed clerk of the council of Cork, and in the following year received a visit from Sir Walter Raleigh, who,

since the death of Sidney in 1586, had become his most intimate friend. He was then engaged in the composition of his great work, the *Faerie Queene*, of which he had written the first three books. With these he accompanied Raleigh the next year to England, where they were published in 1590, with a dedication to Queen Elizabeth. Raleigh also gained him the favor of the queen, who rewarded his poetry and dedication with a pension of £50. It was probably in the same year that the *Daphnaida* was first published, and it is certain that before the close of that year Spenser was again at Kilcolman. He then passed an interval of two or three years in Ireland, where, in 1594, he married. The courtship is celebrated by him in eighty-eight sonnets, and its consummation in his *Epithalamium*. In 1595 he paid another visit to London, and published various volumes such as *Colin Clout's Come Home Again*, and *Astrophel and The Mourning Muse of Thestylis;* his sonnets and *Epithalamium* in one volume; the fourth, fifth, and sixth books of the *Faerie Queene*, together with a new edition of the first three books; his *Prothalamium* or *Spousal* verse on the marriages of the Ladies Elizabeth and Catharine Somerset; and *Four Hymns in Honour of Love, of Beauty, of Heavenly Love, and of Heavenly Beauty*, together with a reprint of his *Daphnaida* and *Epithalamium*. It was probably also during this visit that he drew up his *View of the State of Ireland*, which was presented to Elizabeth, but which lay in MS. until printed, in 1633, by Sir James Ware. In 1597 Spenser returned to Ireland, and in September, 1598, he was appointed sheriff of the county of Cork. The rebellion of Tyrone, however, took place in October, and Spenser's house was fired by the populace, and his infant child perished in the flames. The poet arrived in England with body and spirit broken by these misfortunes, and died the following January, 1599. He was interred in Westminster Abbey at the expense of the Earl of Essex, where a monument was afterwards erected by the celebrated Anne, countess of Dorset. As a poet, although his minor works contain many beauties, Spenser will be judged chiefly from the *Faerie Queene*. In the full title the poem is described as 'disposed in twelve books fashioning twelve moral virtues,' and six of these were published, besides two cantos on *Mutability* first published in 1611. It is allegorical in method, but his allegorical characters are treated with a richness, variety and originality which have given them an enduring place among the creations of English poetry. It is supposed that part of the unfinished poem may have perished when the poet's house was sacked and burned.

Spenserian Stanza, the stanza adopted by Edmund Spenser in his *Faerie Queene*. It consists of a strophe of eight decasyllabic lines and an Alexandrine, and has a threefold rhyme, the first and third lines forming one, the second, fourth, fifth, and seventh another, and the sixth, eighth, and ninth the third. It is the stateliest of English measures, and was adopted by Byron in his *Childe Harold*.

Spergula (sper'gū-la), a genus of plants, nat. order *Caryophyllaceæ*. See *Spurrey*.

Spermaceti (sper-ma-sē'ti), a fatty material obtained chiefly from cavities in the skull of the sperm whale (which see). During the life of the animal the spermaceti is in a fluid state, forming part of the oily liquid which is found when the head of the whale is opened. On exposure to the air the spermaceti concretes, and deposits from the oil. Some of the larger whales have been known to yield twenty-four barrels of spermaceti, and from seventy to a hundred barrels of oil. After being purified the spermaceti concretes into a white, crystallized, brittle, semitransparent unctuous substance nearly inodorous and insipid. It is bland and demulcent, with considerable nutritive qualities when taken internally. It is chiefly employed externally as an ingredient in ointments and cerates. It is also largely used to form candles.

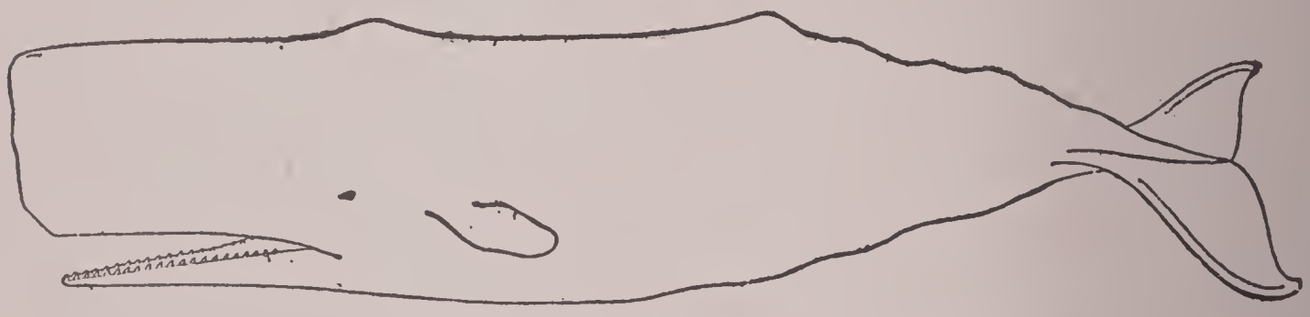
Spermatozoa (sper-ma-tō-zō'a), the microscopic animalcule-like bodies developed in the semen of animals, each consisting of a body and a vibratile filamentary tail, exhibiting active movements comparable to those of the ciliated zoöspores of the algæ, or the ciliated epithelial cells of animals. Spermatozoa are essential to impregnation.

Sperm-oil, the oil of the spermaceti whale, which is separated from the spermaceti and the blubber. (See *Spermaceti.*) This kind of oil is much purer than train-oil, and burns away without leaving any charcoal on the wicks of lamps. In composition it differs but slightly from common whale-oil.

Spermophilus (sper-mof'i-lus), the name of a genus of rodentia, common in North America, where they are known generally as *gophe-*

ers and *ground-squirrels*. Eastern Europe produces one species, *S. citillus*, called also the *suslik*.

Sperm Whale, or CACHALOT (*Physēter macrocephalus*), a species of cetacea belonging to the section of the whale order denominated 'toothed' whales, generally met with in the Pacific, but occasionally also on the coast of Greenland. The large blunt head in an old male is sometimes 30 feet long, and forms about a third of the total length of the body; while the 'blow-holes' or S shaped nostrils are situated in the front part of the head. The weight of an adult animal is estimated at about 200 tons, and in a male 66 feet long the flipper measured 5 feet 3 inches, and the two-lobed tail-fin had a breadth of nearly 20 feet. The top of the back is continued almost in a straight line from the upper part of the head; the belly is enormous, but the body thins off towards the wide tail. The color is a blackish-gray, which may exhibit greenish or bluish hues on the upper parts. The teeth of the lower jaw average each about 3 inches in length. This whale is of considerable commercial value alike for its oil and its yield of Spermaceti, *q. v.*



Sperm Whale (*Physēter macrocephalus*).

Spey (spā), the most rapid river of Scotland; 110 miles long, from Inverness-shire to Moray Firth. Noted for its salmon fisheries.

Sperry (sper'i), ELMER AMBROSE, an American electrical engineer, born at Cortland, N. Y., in 1860; inventor of the gyro-compass, and the gyro-stabilizer for ships and aeroplanes (see *Gyroscope*). Also inventor of fire-control apparatus, highest intensity searchlight, and numerous special devices principally for the United States Navy.

Speyer, or SPEIER (spī'ėr). See *Spires*.

Spezia (spāt'si-a), a seaport town in Italy, 50 miles E. S. E. of Genoa, on the Gulf of Spezia, which here forms an admirable harbor. It is a great Italian naval station, and has a marine arsenal, cannon-foundries, various yards, docks, and basins, and is defended by two forts. It has an active trade. Excellent olive-oil and wine are produced in the vicinity. Pop. 74.000.

Spezzia (spet'si-a; ancient, *Tiparēnos*), an island in the Grecian Archipelago, at the eastern entrance of the Gulf of Napoli, about 3 miles S. S. W. of the coast of Argolis; length, 4 miles; breadth, about 3 miles. The chief town, bearing the same name, stands on the east shore, and the greater part of the inhabitants are employed in commercial pursuits. Pop. 4432.

Sphærularia (sfē-ru-lā'ri-a), a nematode or round parasitic worm existing in certain species of bees. The female is nearly an inch in length, and consists of little else than a mass of fatty tissue with reproductive organs, neither mouth, œsophagus, intestine, nor anus being present. The male is only about the 28,000th part the size of the female.

Sphagnum (sfag'num), a genus of mosses, widely diffused over the earth in temperate climates readily recognized by their pale tint, fasciculate branchlets, and apparently sessile globose capsules. They are aquatic plants, and constitute the great mass of our bogs in swampy and moory districts.

Sphene (sfēn), a mineral composed of silicic acid, titanic acid, and lime. Its colors are dull yellow, green, gray, brown, and black. It is found both in the amorphous and in the crystalline state. The primary form of its crystal is an oblique rhombic prism.

Sphenodon (sfē'nu-don), a peculiar genus of lizards, regarded as forming a family by itself. It was represented by several genera in geologic times. The only extant species (*S. punctātum*) is a native of New Zealand, and, although once abundant, is now being rapidly thinned. Of late it has become the favorite food of the pig, and is eaten by man. It frequents rocky islets, living

in holes in the sand or among stones. It is also called *Hatteria punctata.*

Sphenoid Bone (sfē'noid). See *Skull.*

Sphere (sfēr), in geometry, a solid body contained under a single surface, which in every part is equally distant from a point called the center. It may be conceived to be generated by the revolution of a semicircle about its diameter, which remains fixed, and which is hence called the *axis* of the sphere. A section of a sphere made by a plane passing through its center is called a *great circle* of the sphere; and when the cutting plane does not pass through the center the section is called a *small circle* of the sphere. A sphere is two-thirds of its circumscribing cylinder. Spheres are to one another as the cubes of their diameters. The surface of a sphere is equal to four times the area of one of its great circles, and the solidity is found by multiplying the cube of the diameter by .5236 or $\frac{2}{3}$ of .7854; or by multiplying the area of a great circle by $\frac{2}{3}$ of the diameter.

Spherograph (sfer'u-graf), a nautical instrument consisting of a stereographic projection of the sphere upon a disk of pasteboard, in which the meridians and parallels of latitude are laid down to single degrees. By the aid of this projection, and a ruler and index, the angular position of a ship at any place, and the distance sailed, may be readily and accurately determined on the principle of great circle sailing.

Spheroid (sfēr'oid), a body or figure approaching to a sphere, but not perfectly spherical; in geometry, a solid generated by the revolution of an ellipse about one of its axes. When the generating ellipse revolves about its longer or major axis, the spheroid is *oblong* or *prolate;* when about its less or minor axis, the spheroid is *oblate.* The earth is an oblate spheroid, that is, flattened at the poles, so that its polar diameter is shorter than its equatorial diameter.

Spheroidal State (sfēr-oid'al), the condition of a small quantity of liquid when, on being placed on a highly heated surface, as red-hot metal, it assumes the form of a more or less flattened spheroid, and evaporates without ebullition. The spheroid in this condition does not touch the surface of the metal, but floats on a layer of its own vapor, and evaporates rapidly from its exposed surface. It is heated mainly by radiation from the hot surface, because conduction is impossible since the layer of intervening vapor conducts heat very feebly. The formation of a layer of non-conducting vapor explains why it is possible to dip the wetted hand into molten iron with impunity.

Sphincter (sfink'ter), in anatomy, a name applied generally to a kind of circular muscles, or muscles in rings, which serve to close the external orifices of organs, as the sphincter of the mouth, of the eyes, etc., and more particularly to those among them which, like the sphincter of the anus, have the peculiarity of being in a state of permanent contraction, independently of the will, and of relaxing only when it is required that the contents of the organs which they close should be evacuated.

Sphingidæ (sfin'ji-dē), a family of lepidopterous insects, section Crepuscularia. The insects belonging to this division generally fly in the evening or early in the morning, but there are many which fly in the daytime. This family embraces some of the largest moths, as the death's-head hawk-moth, and the privet hawk-moth.

Sphinx (sfinks), a fabulous monster which figures both in the Grecian and Egyptian mythologies. The sphinx of the Greeks is represented with a body like that of a lion, with wings, and with the breasts and upper parts of a woman. Hēra, says the fable, provoked with the Thebans, sent the sphinx to punish them. The sphinx proposed a

Egyptian Sphinx, from the Louvre Museum.

riddle and devoured anyone who undertook but was unable to interpret its meaning. In this enigma the question proposed was: What animal walked on four legs in the morning, two at noon, and three in the evening. This was at last explained by Œdipus, who said that man walked on his hands and feet when young, or in the morning of life; at the noon of life he walked erect; and in the evening of his days he supported himself upon a

stick. Whereupon, her riddle being read, the sphinx destroyed herself. The sphinx was used by the Greeks for artistic and decorative purposes, and seems to have been in some sense symbolic. The Egyptian sphinx had a human head (male or female) on the body of a lion (not winged), and was always in a recumbent posture, with the fore-paws stretched forward, and a headdress resembling an old-fashioned wig. The features are like

Sphinx and Pyramid of Gizeh.

those of the ancient Egyptians found in the ancient ruins. The largest sphinx, that near the group of pyramids at Gizeh, is about 150 feet long and 63 feet high; the body is monolithic, but the paws, which are thrown out 50 feet in front, are constructed of masonry. There were also sphinx figures in Egypt with rams' heads and hawks' heads. The Egyptian sphinx was probably a purely symbolic figure, having no historical connection with the Greek fable, and the Greeks may have applied the term to the Egyptian statues merely on account of an accidental external resemblance to their own figures of the sphinx.

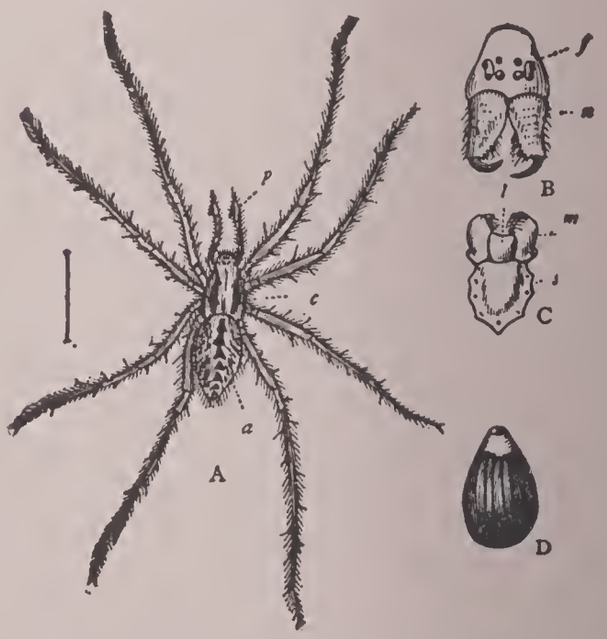
Sphinx-moth (*Sphinx Convolvuli*), a species of moth belonging to the family Sphingidæ (which see); so called from the stiff, erect pose assumed by the larvae when disturbed.

Sphygmomanometer (sfig'mō-ma-nom'e-ter; Gr. *sphugmos*, pulse; *manos*, rare; *metron*, measure), an instrument for measuring the tension of the blood current. Some of these instruments have mercury at the end of a tube, like a thermometer; others are operated by a spring that moves hands on a dial. Pressure is applied to the arm by a rubber armlet which is connected by two rubber tubes (1) with a mercurial manometer (or spring and dial), and (2) with a rubber bulb or air piston. The pressure just sufficient to obliterate the pulse or to allow it to reappear after obliteration is taken as the systolic pressure. Some forms of the sphygmomanometer are adapted for obtaining the systolic pressure only; others for obtaining either the systolic or diastolic pressure, or both. The average systolic pressure in adults ranges from 110 to 135 millimeters of mercury. — The sphygmograph registers the character of the pulse on a strip of paper moved by clockwork.

Spice Islands. See *Moluccas.*

Spice (spīs), the name given to all those vegetable substances, having an aromatic odor and a hot and pungent flavor, and used for seasoning food, such as cinnamon, cassia, mace, nutmeg, allspice, pepper, cloves, ginger, vanilla.

Spider (spī'der), the common name of insect-like animals, constituting a section of the class Arachnida, order Pulmonaria. The head and chest are united to form one segment known as a cephalothorax; no wings are developed, and breathing is effected by means of pulmonary or lung sacs. For the most part the Arachnida are oviparous. The abdomen is furnished with from four to



A, The male of the common House-Spider (*Tegenaria civilis*) considerably magnified; *c*, Front portion of the body, consisting of the amalgamated head and thorax; *p*, Maxillary palpi; *a*, Abdomen. B, Front portion of the head of the same, showing the eight eyes (*f*) and the mandibles (*n*). C, Under side of the head and trunk, showing the true jaws (*m*), the lower lip (*l*), and the horny plate to which the legs are attached. D, Diagram of one of the air-chambers or breathing-organs. (Figs. A, B, and C are after Blackwall.)

six cylindrical or conical mammillæ or processes, with fleshy extremities, which are perforated with numberless small orifices for the passage of silky filaments of

extreme tenuity, with which they form webs, and which proceed from internal reservoirs. The spider's web is usually intended to entangle their prey (chiefly flies), but spiders also spin webs to make their abodes, and for other purposes. The legs number four pairs, and no antennæ are developed. Their mandibles are terminated by a movable hook, flexed inferiorly, underneath which, and near its extremity, is a little opening that allows a passage to a venomous fluid contained in a gland of the preceding joint. After wounding their prey with their hooked mandibles they inject this poison into the wound, which suddenly destroys the victim. The common garden or cross spider (*Epeira diadēma*), with its geometrical web, is a very familiar species. The great crab spider (*Mygăle cancroides*), and the *M. avicularia* of Surinam, alleged to feed on small birds, are notable forms. To this family also belong the trap-door spiders, which excavate a nest in the ground, and fit to the aperture a curious little door or lid. These are numerous in parts of the western United States. The tarantula (*Lycōsa tarantŭla*) is regarded in Italy as capable of producing a kind of dancing madness by its bite. The English hunting or zebra spider (*Salticus scenicus*) is a pretty little arachnidan. The *Clotho durandii*, inhabiting Spain and North Africa, is remarkable as constructing a kind of little tent, in the interior of which the eggs, inclosed in little pouches, are contained. The interesting water-spiders (*Argyronōta aquatica*), denizens of fresh-water pools, lead a subaqueous life, and construct their nests somewhat in the form of diving-bells with the mouth opening downwards, together with thin webs in which their prey is captured.

Spider-crab, the name given to crabs of the family Maiadæ from the rough general resemblance their bodies and long legs possess to those of spiders. The *Maia squinādo*, or common or thornback spider-crab, is quite a familiar species, and is very commonly taken in the crab-pots of fishermen. The four-horned spider-crab (*Arctopsis tetraodon*) has a triangular body, possessing four horn-like processes in front, the two central ones forming the rostrum or beak.

Spider-fly, a dipterous insect of the family Pupipara. There are many species of these found parasitic on birds and quadrupeds.

Spider-monkey, a general name applied to many species of platyrhine or New World monkeys, but more especially to the members of the genus *Atĕles*, which are distinguished by the great relative lengths, slenderness, and flexibility of their limbs, and by the prehensile power of their tails. A familiar species is the chameck (*Atcles Chamcck*), which occurs abundantly in Brazil. The body is about 20 inches, the tail 2 feet long, and the color is a general black. The coaita (*A. paniscus*), another typical species, has an average length of 12 inches; the tail measures over 2 feet long, and the fur is of a dark, glossy, black hue.

Spider-monkey (*Atĕles paniscus*).

Spiderwort, the common name of plants of the genus *Tradescantia*, one species of which, *T. virginica*, is cultivated in gardens.

Spiegeleisen (spē-gl-ī′zn), a peculiar kind of cast-iron made from specular iron ore, or hæmatite, containing a large percentage of carbon and manganese. Being remarkably free from impurities, as phosphorus, sulphur, silica, it is largely used in the Bessemer process of steel-making for the purpose of reintroducing carbon.

Spielhagen (spēl′hä-gĕn), Friedrich, a German novelist, born at Magdeburg in 1829; entered Berlin University, studied law at Bonn, and taught in the Gymnasium at Leipsic until he adopted the profession of literature. His chief novels are: *Problematical Natures* (1861); *Through Night to Light* (1862); *Hammer and Anvil* (1869); *Ever Forward* (1872); *Storm Floods* (1878); *Uhlenhanns* (1884); *Susi* (1895), and *Faustulus* (1897). He also produced plays, translations, etc.

Spigelia (spī-jē′li-a), worm-seed or worm-grass, a genus of plants, nat. order Loganiaceæ.

Spike (spīk), a species of inflorescence in which the flowers are sessile along a common axis, as in the common plantain.

Spikenard (spīk′nârd), or Nard, a highly aromatic herbaceous plant growing in the East Indies, the *Nardostachys Jatamansi*, nat. order Valerianaceæ. The root has a strong smell and a sharp, bitterish taste. This is the true spikenard of the ancients, and it has enjoyed celebrity from the earliest

Spikenard (*Nardostachys Jatamansi*).

period on account of the valuable extract or perfume obtained from its roots, which was used in the ancient baths and at feasts. It is called *jatamansi* or *balchur* by the Hindus, and *sumbul* or *sunbul* by the Arabians. It is highly esteemed in the East as a perfume, and is used to scent oil and unguents. The name spikenard is applied to various other plants, as to *Valeriāna celtica*, *Andropōgon Nardus*, *Lavandŭla Spica* (see next article). In the United States it is applied to *Aralia racemōsa*.

Spike-oil, a volatile oil obtained by distilling *Lavandula Spica* (a species of lavender) with water. It has a less agreeable odor than true lavender-oil, and is specifically heavier. It is obtained from the leaves and stalks of the plant. True lavender-oil is obtained from the flowers.

Spiking, the operation of driving a nail or spike into the touch-hole of a cannon so as to make it unserviceable. When the spiking was intended to be only temporary a spring spike was used, which was afterwards released by the stroke of a hammer. In other cases a new touch-hole required to be drilled.

Spinage (spin'ij), SPIN'ACH, a genus of plants, nat. order Chenopodiaceæ. There is only one species, *Spinacia oleracea* (common spinach), well known on account of its use in the kitchen. It is eaten sometimes in salads, but more frequently cooked in various ways. It is wholesome and agreeable, but contains little nutriment. There are two principal varieties cultivated in gardens — the prickly-fruited and the smooth-fruited. What is called *New Zealand spinach* (*Tetragonia expansa*), a plant of the family Mesembryaceæ is sometimes used instead of common spinach, as is also Australian spinage (*Chenopodium auricŏmum*). For *mountain spinage* see *Orach*. Indian spinach is *Basella rubra* and *B. alba*.

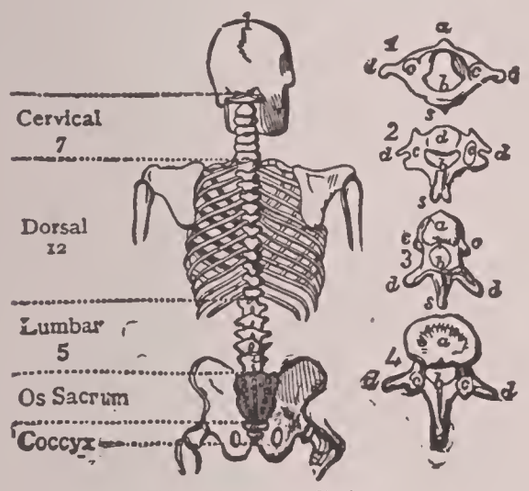
Spinal Cord (spīn'al), the name given in anatomy to the great cord or rod of nervous matter which is inclosed within the backbone or spine of vertebrates. The spinal cord in man, which is from 15 to 18 inches long, has direct connection with the brain by means of the medulla oblongata, and passes down the back until it terminates in a fine thread at the level of the first lumbar vertebra. (See *Spine*.) Lodged in the bony vertebræ it varies in thickness throughout, and like the brain is invested by membranes called respectively *pia mater* and *dura mater*. Situated between these two are the delicate layers of the *arachnoid* membrane, inclosing a space which contains the cerebro-spinal fluid. Besides these protective coverings there is also a packing of fatty tissue which further tends to diminish all shocks and jars. The spinal nerves, to the number of thirty-one on each side, pass out from the cord at regular intervals, pierce the *dura mater*, escape from the backbone, and ramify thence through the soft parts of the body. Eight pairs pass off in the region of the neck called the *cervical* nerves, twelve pairs are *dorsal*, five are *lumbar*, and five *sacral*, while the last pair comes off behind the *coccyx*. In its structure the spinal cord consists of gray and white matter. The gray matter, which is characterized by large cells, is gathered in the center into two crescent-shaped masses connected at the central part of the cord. The white matter, consisting mainly of fibers, is outside of and surrounds these gray crescents. In its functions the spinal cord forms a tract along which sensory impressions may pass to the brain, and along which motor impulses may travel to the muscles. It is besides a great reflex center. See *Brain*, *Nerve* and *Spine*.

Spindle (spin'dl), in *spinning*, a pendant piece of wood for twisting and winding the fibers drawn from the distaff, or the pin used in spinning-wheels for twisting the thread, and on which the thread, when twisted, is wound. It is applied also to a measure of yarn; in cotton a *spindle* of 18 hanks is 15,120 yards; in linen a *spindle* of 24 heers is 14,400 yards.

Spindle-tree (*Euonymus*), a genus of small trees or shrubs belonging to the natural order Celastracæ. The leading species are from 10 to 30 feet in height; and in autumn they become attractive by reason of their great profusion of seed-vessels, which are generally of a delicate pink or white color. The common spindle-tree (*Euonymus europœus*) is found wild throughout the north of Europe. The wood is of a white color, finely grained, and hard. It was once esteemed as a material for musical instruments and spindles, hence its name. *E. Americanus*, the burning

bush, is found growing in moist woods in the United States and Canada.

Spine (spīn; L. *spina*, a thorn), the term applied to the backbone of a vertebrated animal, and so called from the thorn-like processes of the vertebræ. The human vertebral column is composed, in the child, of thirty-three separate pieces, but in the adult the number is only twenty-six, several pieces having become blended together. These separate bones are arranged one on the top of the other, with a layer of gristle between each which helps to unite them, while this union is completed by partially movable joints and strong fibrous ligaments. The first seven vertebræ, which are called *cervical*, occupy the region of the neck; twelve form the supports from which spring the ribs, and constitute the main portion of the back, being accordingly called *dorsal;* five in 'the small of the back' are denominated *lumbar;* five pieces follow which, in the adult, unite to form the *sacrum;* and four which unite to form the *coccyx*. The vertebral column so arranged presents two forward curves, the first in the neck, the second at the lower part of the back; and two corresponding backward curves. The vertebræ differ in form according as they belong to the cervical, dorsal, or lumbar region, but they have all certain characteristics in common. Each possesses what is called a body, an arch which incloses a ring, and various projections and notches by means of which the bones are articulated. When the vertebræ are in position the rings are all situated one above the other, and so form a cavity or canal in which lies the protected spinal cord (which see). The disease to which this bony structure is most liable is called *angular curvature of the spine*. Beginning with inflammation it goes on to ulceration (caries), until one or more of the vertebræ becomes soft and breaks down. The result of this is that the vertebræ are crushed together, the backbone bent, and a projection or hump gradually formed behind. The modern method of treatment is to apply to the patient's body, from the hips to the armpits, a continuous bandage of plaster of Paris, which affords to the back a close-fitting support. *Lateral curvature of the spine*, unlike the former, is not so much due to disease of the column as to a relaxed condition of the body. It is most liable to attack young rapidly-growing persons between the ages of ten and fifteen. Treatment by plaster of Paris bandage may be necessary; but strengthening food, regular, moderate exercise, and cold bathing may prove sufficient to effect a cure.



The Human Spine.

1, Atlas, or vertebra supporting the head. 2, Cervical vertebra. 3, Dorsal vertebra. 4, Lumbar vertebra. *a*, Body. *b*, Ring. *c*, Oblique or articular process. *d*, Transverse process. *s*, Spinous process.

Spine, in botany, a sharp process from the woody part of a plant. It differs from a *prickle*, which proceeds from the bark. A spine sometimes terminates a branch, and sometimes is axillary, growing at an angle formed by the branch or leaf with the stem. The wild apple and pear are armed with spines; the rose, bramble, gooseberry, etc., are armed with prickles. The term is applied in zoology to a stout, rigid, and pointed process of the integument of an animal, formed externally by the epidermis and internally of a portion of the cutis or corresponding structure.

Spinelle, or SPINEL (spin'el), a species of gem, a sub-species of corundum, which occurs in regular crystals and sometimes in rounded grains. Its colors are red, black, blue, green, brown and yellow. It consists chiefly of alumina, with smaller proportions of magnesia, silica, and protoxide of iron. Clear and finely-colored red varieties are highly prized as ornamental stones in jewelry. The red varieties are known as *spinelle ruby* or *balas ruby*, while those of a darker color are called *Ceylonite* or *Pleonast*. It is found in the beds of rivers in Ceylon, and Siam, and embedded in carbonate of lime in North America and Sweden.

Spinet (spin'et), an old stringed instrument with a keyboard for the fingers, somewhat similar to the harpsichord but much smaller in size, one of the precursors of the piano. The strings, which were placed at an angle with the keys, were sounded by means of crow-quill plectra attached.

Spinning (spin'ing), is the art of twisting a thread from wool, flax, cotton, or other such material. From remote times this process was accomplished by means of a distaff round which the wool or other fiber to be spun was coiled, and a spindle or round stick tapering at each end and with a notch for fixing the yarn or thread at the upper end as the spinning went on. The spindle was twirled round, for the purpose of twisting the thread, generally by a movement against the right leg, and while the left hand of the spinner guided and supplied the fiber, the right hand fashioned it into a thread between finger and thumb. The earliest improvement on this method was to fix the spindle horizontally in a frame and cause it to revolve rapidly by means of a band passed round a large wheel. At a later period a treadle motion was added, and the spinner's hands were left free (see *Spinning-wheel*); while a further improvement was effected by the introduction of a double spindle-wheel, with twisting arms on the spindles. This was the spinning implement which obtained until the invention, about 1767, of the spinning-jenny. See *Cotton Spinning.*

Spinning-jenny, the name given to the first spinning-machine by means of which a number of threads could be spun at once. It was invented about 1767 by James Hargreaves, a Lancashire weaver, and consisted of a number of spindles turned by a common wheel or cylinder worked by hand.

Spinning-wheel, a machine for spinning wool, cotton, or flax into threads by the hand. It consists of a wheel, band, and spindle, has a distaff attached, and is driven by foot or by hand, usually the former, a treadle being employed. Before the introduction of machinery for spinning there were two kinds of spinning-wheels in common use, the *large wheel* for spinning wool and cotton, and the *small* or *Saxon wheel* for spinning flax. See *Spinning.*

Spinola (spē'no-lȧ), Ambrosio, Marquis of, a distinguished general and member of an ancient Italian family, was born at Genoa about 1569; and died in 1630. He joined the Spanish forces in the Netherlands, and when the Archduke Albert of Austria had failed to reduce Ostend after a lengthy siege, he was superseded by Spinola, who was successful (1604). He was thereupon appointed commander-in-chief of all the Spanish and Italian forces in the Netherlands. During the following five years he frequently encountered Maurice, prince of Orange, with no decisive results, and at length the war was ended by an armistice (1609). Spinola was next actively engaged in the Thirty Years' war. In 1620 he conquered the Lower Palatinate, and when the armistice with Holland was broken he invaded that country. He laid siege to Bergen-op-Zoom, from which he had to retreat; but in 1624 he invested and reduced Breda after ten months' siege. This was his last great military achievement.

Spinoza (spē-nō'zȧ), Baruch, or as he afterwards called himself, Benedict de Spinoza, was born in 1632, of Portuguese-Jewish parents, in the then free city of Amsterdam, and died in 1677. He was trained in Talmudic and other Hebrew lore by Rabbi Morteira; acquired a knowledge of Latin from the free-thinking physician, Van den Ende; came under the influence of the new philosophic teaching of Descartes; ceased to attend the synagogue; refused a pension offered by the rabbis for his

Benedict de Spinoza.

conformity, and was expelled from the Israelitish community; fled from Amsterdam to the suburbs to escape the enmity of the fanatical Jews; removed from thence, after five years' seclusion, to Rynsburg, where he lived until 1663; subsequently went to Voorburg; and ultimately (1671) settled in The Hague, where he died. By his craft as a grinder of optical lenses he maintained a frugal position in the households of the friends with whom he lived. He refused a pension from the French king and a professorship in Heidelberg because their acceptance might hazard that high freedom of thought and conduct which was ever his jealous care; but he accepted a legacy from his friend, De Vries. This annuity

enabled him to devote a large part of his time to the study of philosophy. The first result of his labor was published anonymously in 1670 under the title of *Tractatus Theologico-Politicus*, and, because it put forth a strong plea for liberty of speech in philosophy, it was placed on the Index by the Catholics, and condemned by the authorities in Holland. Such, indeed, was the storm which this treatise occasioned that the author himself published nothing further. After his death all his unpublished writings were conveyed to Amsterdam, and there the *Opera Posthuma* was published (1677). In the *Ethics*, therein included, his system of philosophy was developed; each of its five books being dignified by a series of axioms and definitions after the method of Euclid in his geometry. In all there are twenty-seven definitions, twenty axioms, and eight postulates; and the central conception of the whole system is, that God, who is the inherent cause of the universe, is one absolutely infinite substance, of which all the several parts which we recognize are but finite expressions; that man, being but a part of this greater whole, has neither a separate existence nor a self-determining will; but that he can, by means of knowledge and love, so far control his passions as to enter into the joy which springs from this idea of an all-embracing God.

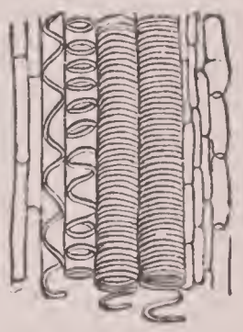
Spinthariscope, an instrument devised by Sir William Crookes in 1903 to show the luminous effects due to radium. It indicates by scintillations the impacts on a fluorescent screen of the alpha particles given off by radium.

Spiracle (spir'a-kl), the name given to the apertures existing on the sides of the body in insects, centipedes, spiders, etc., and through which air is admitted to the breathing organs, which consist of air-tubes. As commonly seen, each spiracle presents the form of a rounded or oval opening, the margin of which is formed by a horny ring. The opening itself may be closed by a kind of grating.

Spiræa (spi-rē'a), a genus of plants, nat. order Rosaceæ. The species, which are diffused through the temperate parts of the northern hemisphere, generally consist of small, unarmed shrubs or perennial herbs, with simple or compound leaves and racemes or corymbs of white or reddish flowers. Several North American, Indian, and Japanese shrubby species are in cultivation. There are two species in Great Britain which are known by the name of *meadow-sweet.*

Spiral (spī'ral), in geometry, the name given to a class of curves distinguished by this property, that they continually recede from a center or fixed point while they continue to revolve about it. The moving point is the *generatrix* of the spiral, the fixed point is the *pole* of the spiral, and the distance from the pole to any position of the generatrix is the *radius vector* of that point.

Spiral Vessels, in vegetable anatomy, fine transparent membranous tubes, with one or more spiral fibers coiled up in their interior. They are generally present among the other vessels of plants, and in trees are found chiefly in the medullary sheath surrounding the pith. The fiber may be single or double, or it may be composed of numerous threads. Their function is supposed to be that of the conveyance of air. They are easily discovered on breaking asunder the leaves and stalks of many plants, when the fibers may be unrolled, and present themselves as delicate filaments like the threads of a cobweb.



Spiral Vessels of Rhubarb, with cell tissue on each side — highly magnified.

Spire (spīr), a term specifically applied to the tapering portion of a steeple rising above the tower, but sometimes loosely applied to the steeple itself. The earliest spires, in the architectural sense, were merely pyramidal or conical roofs, specimens of which still exist in Norman buildings. These roofs, becoming gradually elongated and more and more acute, resulted at length in the elegant tapering spire. The spires of mediæval architecture (to which alone the term is appropriate) are generally square, octagonal, or circular in plan; they are sometimes solid, more frequently hollow, and are variously ornamented with bands encircling them, with panels more or less enriched, and with spire lights, which are of great variety. Their angles are sometimes crocketed, and they are almost invariably terminated by a finial. The term spire is sometimes restricted to signify such tapering buildings, crowning towers or turrets as have parapets at their base. When the spire rises from the exterior of the wall of the tower without the intervention of a parapet it is called a *broach.*

Spires (spīrz; German, *Speyer* or *Speier*), a town in Bavaria, capital of the Rhenish Palatinate, at the

confluence of the Speyerbach with the Rhine, 10 miles S. S. W. of Mannheim. In early times Spires was a fortified outpost of the Romans, and after Charlemagne it was long the residence of the emperors of Germany and the seat of the Germanic Diet. The prosperity of Spires began to decline in the seventeenth century by a change in the channels of trade, and in 1689 the city was burned and blown up with gunpowder by the soldiery of Louis XIV. For many years it remained a heap of rubbish, but since it came into possession of Bavaria in 1816 the old buildings have been restored. The chief edifice is the cathedral, a Romanesque basilica, a simple but vast and imposing building, begun in 1030 by Conrad II, and completed by Henry IV, in 1061. When the city was burned the blackened walls of this building remained, but the ashes of the eight German emperors buried in the choir were scattered. It was not till the present century that it was repaired and adorned. At the Diet of Spires, held in 1529, the reformers adopted the protest which conferred on them the name of Protestants. Pop. (1905) 21,823.

Spirit (spir'it), immaterial intelligence, intelligence conceived of as apart from any physical or corporeal embodiment, or an intelligent being so existing apart; also applied to the soul, to a disembodied soul, a specter, etc.

Spirit, Spirits. See *Alcohol.*

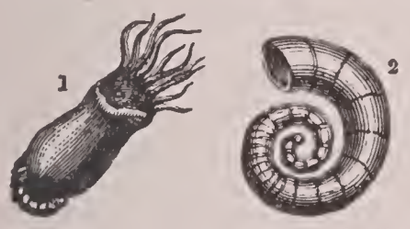
Spirit-level, an instrument employed for determining a line or plane parallel to the horizon, and also the relative heights of ground at two or more stations. It consists of a tube of glass nearly filled with spirit of wine, and hermetically sealed at both ends, so that when held with its axis in a horizontal position the bubble of air which occupies the part not filled with the liquid rises to the upper surface and stands exactly in the middle of the tube. The tube is placed within a brass or wooden case, which is laid on the surface to be tested, and the slightest deviation from the horizontal is indicated by the bubble rising towards the higher end of the tube.

Spiritualism (spir'it-ū-al-izm), the term used in philosophy to indicate the opposite of *materialism*, but now also specifically applied to the belief that communication can be held with departed spirits by means of rappings or noises, writings, visible manifestations, etc. The belief in such manifestations has long obtained, but in its limited and modern form spiritualism dates from the year 1848. In this year a Mr. and Mrs. Fox, who lived with their two daughters at Hydeville, New York, were disturbed by repeated and inexplicable rappings throughout the house. At length it was accidentally discovered by one of the daughters that the unseen 'rapper' was so intelligent as to be able to reply to various pertinent questions, and so communicative as to declare that he was the spirit of a murdered peddler. When this discovery was noised abroad, a belief that intercourse could be obtained with the spirit-world became epidemic, and numerous 'spirit-circles' were formed in various parts of America. The manifestations thus said to be obtained from the spirits were rappings, table-turnings, musical sounds, intelligent communications, raising of heavy bodies, etc. Part of the peculiarity of these phenomena was that they were always more or less associated with a *medium*, who was supposed to have an organization sensitively fitted to communicate with the spirit-world. The first professional *medium* who came to Europe was a Mrs. Hayden, and she was followed in 1855 by Daniel D. Home, who visited nearly all the courts of Europe. The latter possessed unusual powers, and was said to be able to float up to the ceiling or out of the window and into the next room. Such claims not only attracted the curious, and converted the unthinking, but also received the attention of legal and scientific men. In America Judge Edmonds and Professor Hare undertook to expose their fallacy, but both had to admit the genuineness of some of the evidence; while in England the truth of the phenomena gained the assent of such eminent converts as Alfred Russell Wallace, Sir William Crookes, and Professor De Morgan. The London Dialectical Society appointed a committee to investigate the phenomena, and the report (1871) declares the genuineness of the phenomena, but does not seek to explain their origin. In America the believers in spiritualism are very numerous, and have many newspapers, magazines, and books to explain and enforce their belief. In 1882 a Society for Psychical Research was organized in London for the purpose of making a scientific investigation of psychic phenomena in general, including those of spiritualism. This society is made up of members distinguished in scientific and other circles, and has had for president such well-known persons as Professor J. Balfour, former British premier, Sir Oliver Lodge, and others of equal note. It has made very numerous investigations, and has decided that many of the

manifestations are genuine, some of the leading members accepting them as of spirit origin. The belief generally held by non-investigators is that the phenomena of spiritualism are the result either of self-delusion on the part of believers, unconscious deception on the part of the *medium*, or clever conjuring. The literature published by the Society named is voluminous. It has branches in the United States, where a similar society has recently been organized and interesting literature published.

Spirometer (spī-rom'e-ter), a contrivance for determining the capacity of the human lungs. The instrument most commonly employed consists of an inverted chamber submerged in a water-bath. The breath is conducted by a flexible pipe and internal tube, so as to collect in the chamber, which rises in the water, and is fitted with an index which marks the cubic inches of air expired after a forced inspiration.

Spirula (spir'ū-la), a genus of cuttle-fishes or cephalopods, comprising only three known species, so named from their very delicate shell being rolled into a spiral form. The shells



1, *Spirula australis.* 2, Its shell.

are very numerous on the shores of New Zealand, but the animal forming them is extremely rare, being seldom found except in a fragmentary state.

Spitalfields (spit'al-fēldz), an English parish, county of Middlesex, borough of Tower Hamlets, and one of the eastern suburbs of London. After 1685 it was, and still is, occupied by French Protestant silk weavers, and is a great seat of the silk manufacture. It takes its name from the spital or hospital of St. Mary, founded here in the twelfth century. Pop. 33,498.

Spithead (spit'hed), the roadstead at the entrance of Portsmouth harbor, which extends about 2 miles N. W. and S. E., with an average width of 1½ mile. See *Portsmouth.*

Spitzbergen (spitz-bėrg'en), a group of three large and several small islands in the Arctic Ocean, between lat. 76° 30′ and 80° 40′ N.; lon. 9° and 22° E.; nearly equidistant between Greenland and Nova Zembla, the largest being West Spitzbergen and Northeast Land. Very little is known of their interior, but the coasts have been repeatedly explored, and present immense glaciers and mountain chains, some of which exceed 4000 feet in height. The climate is intensely cold; and vegetation is confined to a few plants of rapid growth. For four months in winter the sun is below the horizon, and for an equal period in summer the sun is always above the horizon. The larger forms of animal life are foxes, bears, and reindeer, while seafowl are numerous. The minerals are known to include marble and good coal. The group appears to have been discovered in 1553 by Willoughby, the English navigator, and was again visited in 1596 by the Dutch navigator Barentz in endeavoring to effect a northeast passage to India. Among the later explorers are Leigh Smith, Nordenskjöld, Andreasen, and Johannesen.

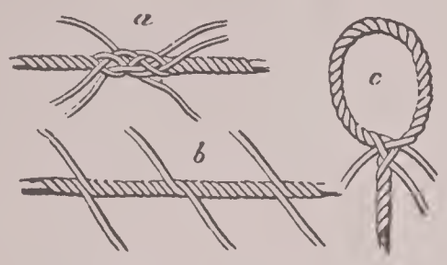
Spitz-dog, a small variety of dog, resembling the Esquimaux dog. It has short, erect ears, a pointed muzzle, a curved, bushy tail, long hair, and in color it varies from pure white to cream color, and is sometimes jet black. It is handsome, intelligent, and makes an excellent watch-dog.

Spleen (splēn), in man, is the chief of the ductless or blood glands, and its action is supposed to affect the quality of the blood. This gland, which in man is situated in the belly to the left side of the stomach, is an elongated, flattened structure about 5 inches in length, 3 inches broad, and 7 ounces in weight. Its supply of blood is received directly from the aorta by means of the *splenic artery* and, after passing through the organ, is carried off by the *splenic vein* which joins the portal vein. It is composed of a fibrous tissue divided into an irregular network of spaces which contain the *spleen pulp.* This pulp consists of masses of round white corpuscles, some larger and some smaller, which are called the *Malpighian bodies* of the spleen. Through each one of these cellular masses there passes a branch from the splenic artery, and in this way the blood filters through the pulp as though it were a sponge, and is then collected by the veins. The function of the spleen is not clearly known, but it is supposed that the active cells of the pulp either remove old red cells from, or add new white cells to, the blood current in its passage through the organ. The ancients supposed the spleen to be the seat of melancholy, anger, or vexation, and of evil humors generally.

Spleenwort (splēn'wurt), the common name of various ferns of the genus *Asplenium.* These

plants were so named because they were supposed to remove disorders of the spleen. They grow in rocky woods.

Splicing (splīs'ing), the union or joining together of two ropes or parts of a rope by a particular manner of interweaving part of the untwisted strands. The *long splice* occupies a great extent of rope, but by the three joinings being fixed at a distance from one another, the increase of bulk is diminished, hence it is adapted to run through the sheave-hole of a block, etc. The *short splice* is used upon ropes not intended to run through blocks, and the *eye splice* forms a sort of eye or circle at the end of a rope.



Splices of Ropes.
a, Short Splice. *b*, Long Splice.
c, Eye Splice.

Splint, in surgery, a thin piece of wood or other substance, used to hold or confine a broken bone when set, or to maintain any part of the body in a fixed position. A *plaster of Paris splint* is made by charging a bandage of muslin or other open material with plaster of Paris, and washing over each layer with water. The plaster hardens rapidly.

Splint-armor, a name given to that kind of armor which was made of several overlapping plates, but never came into very general use. Mention of splint-armor first occurs about the reign of Henry VIII.

Splint-bone, one of the two small bones extending from the knee to the fetlock of a horse, behind the canon or shank bone.

Splügen (splü'gen), a mountain pass which traverses the Rhætian Alps from the canton of Grisons, Switzerland, into Italy; height, 6940 feet. The modern road was constructed in 1823 by the Austrian government, and is protected from avalanches by three galleries of solid masonry.

Spohr (spōr), Ludwig, a German violinist and musical composer, was born in Brunswick in 1784; died in 1859. His operas include *Faust*, *The Alchymist*, *The Crusader*, etc., and his oratorios, *The Crucifixion*, *The Last Judgment*, and the *Fall of Babylon*, take high rank among works of this kind. He wrote many other musical compositions.

Spofford (spof'ord), Ainsworth R., librarian, was born in Gilmanton, New Hampshire, in 1825, and received a classical education. In 1859 he was associate editor of the *Cincinnati Daily Commercial;* in 1861 was appointed first assistant librarian in the Library of Congress; in 1864 librarian in chief. As a librarian Mr. Spofford was widely known for his comprehensive knowledge of books and their contents. He wrote largely for the periodical press, and edited with others a *Library of Choice Literature* (10 vols.); *Library of Wit and Humor* (5 vols.); and *A Practical Manual of Parliamentary Rules.* During his administration the National library grew from 70,000 to over 600,000 volumes. He died August 11, 1908.

Spofford, Harriet Prescott, an American novelist (1835-1921), born at Calais, Maine. She wrote *Sir Rohan's Ghost*, *The Amber Gods*, *Marquis of Carabas*, etc.

Spokane (spō-kan'), a city, county seat of Spokane Co., Washington, on the Spokane River, and on 7 railroads. Seat of Gonzaga College (Roman Catholic; founded, 1887; 500 students); Spokane College, Spokane University, Whitworth College and Brunot Hall. It has extensive lumber, mining, agricultural and manufacturing interests. It is noted for its water power development and is the principal livestock center in the Pacific Northwest, with several large packing plants. Pop. (1900) 36,848; (1910) 104,402; (1920) 104,437.

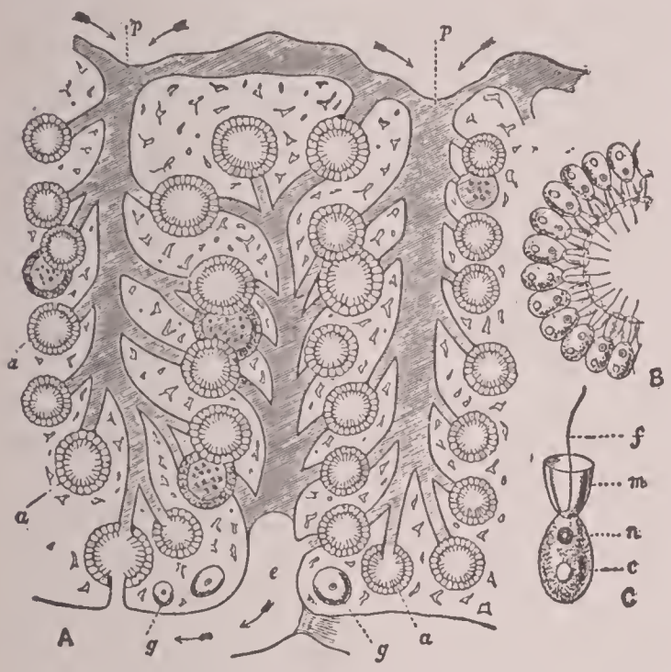
Spoleto (spō-lā'tō), an ancient town of Italy, province of Perugia, 61 miles N. N. E. of Rome. Situated on a steep height, the town is approached by a bridge about 290 feet high and 690 feet long, which is also used as an aqueduct. The principal edifices are the cathedral, the Gothic churches of San Dominico and San Giovanni, the collegiate church of San Pietro, and the citadel. Pop. 24,648.

Spondee (spon'dē), a poetic foot of two long syllables, used in Greek and Latin poetry.

Spon'dias. See *Hog-plum.*

Sponge (spunj), the name commonly given to the animals of the class Porifera, a class of organisms representing a distinct morphological type, intermediate between the Protozoa and the Cœlenterata. The typical members are composed of two elements,

an internal supporting framework or skeleton, and a soft gelatinous investing substance called *sarcode*, or 'flesh.' The framework consists of horny, reticulated, elastic fibers, which interlace in every direction, strengthened by calcareous, or, more generally, by siliceous spicula. This framework is the sponge



Structure of Sponges.

A, Vertical section of the outer layer of *Halisarca lobularis*, a Sponge in which the skeleton is wanting, enlarged 75 times (after F. E. Schultze): *p p* 'Pores,' or openings of inhalant canals by which water is conducted to the ciliated chambers (*a a*); *e* Commencement of a larger exhalant canal, conducting from the ciliated chambers to the deeper canals, by which the water is finally carried off to be expelled from the 'oscula'; *g g* Young stages of the reproductive bodies or spores. B, Part of a single ciliated chamber of the same sponge, transversely divided, and enlarged 800 diameters (after Saville Kent), showing the flagellate cells or 'sponge-particles,' with their inwardly directed flagella. C, A single flagellate cell of the same, still further enlarged; *f* Flagellum; *m* Collar round the base of the flagellum; *n* Nucleus; *c* Contractile vesicle.

of commerce. The sponge-flesh investing this framework is composed of an aggregation of organless, protoplasmic and amœbiform bodies, some ciliated and others capable of emitting pseudopodia. A constant circulation of water goes on in the living sponge, and by this circulation the animal is nourished. Reproduction takes place both by germination and true ova. Sponges have been classified into three groups: (*a*) Myxospongiæ, few in number, in which no skeleton of any kind exists. (*b*) Calcispongiæ, or limy sponges, which have no horny skeleton, but are composed of limy spicules. (*c*) Fibrospongiæ, or those in which a fibrous skeleton exists, strengthened usually by flinty spicules. The name *glass-sponges* is given to certain sponges having a highly ornamental glass-like appearance. The Venus' flower-basket and the glass-rope zoöphytes are examples. In common usage the term sponge is employed to designate the fibrous framework of sponges as sold in our shops. This framework is soft, light, and porous, easily imbibing fluids, and as readily giving them out again upon compression. Burnt sponge was formerly a valued remedy for scrofulous diseases and goiter; but iodine and bromine, from which it derived all its value, are now administered in other forms. Mattresses, etc., are stuffed with sponge; and it is also employed as a filter and a polishing material for fine surfaces. Sponges are usually prepared before they come into the market, by being beaten and soaked in dilute muriatic acid, with a view to bleach them and dissolve any adherent portions of carbonate of lime. The kinds most fit for use are found in the seas of warm climates. Two species are chiefly brought from the Levant, and a coarse one from the West Indies and the coast of Florida. Sponges have been artificially cultivated in the Adriatic and in Florida by means of planting cuttings in suitable waters.

Sponging-house, the name formerly given in England to a victualing-house or tavern, where persons arrested for debt were kept by a bailiff for twenty-four hours before being lodged in prison, in order that their friends might have an opportunity of settling the debt. Sponging-houses were so named from the extortionate charges made upon prisoners for their accommodation.

Sponsor (spon'sur), one who is surety for an infant at baptism, professing the Christian faith in its name, and guaranteeing its religious education; a godfather, or godmother. Up till the ninth century the actual parents were allowed to become sponsors, but this was prohibited by the council of Mainz (1813), and the prohibition still continues in the Roman Catholic Church. The Roman and Greek Catholic churches consider the relation of the sponsor to the godchild a kind of adoption, and therefore forbid marriage between them. The Book of Common Prayer enjoins that there shall be two godfathers and godmothers for a male child, and two godmothers and

one godfather for a female, but this is not rigidly adhered to.

Spontaneity (spon-ta-nē′i-ti), the doctrine that there is a tendency, for the various muscular movements called voluntary, to begin without reference to any purpose or end, being prompted simply by the discharge of power from the brain, and being entirely independent of the stimulus of sensations. The great activity of young animals, as puppies and kittens, after refreshment and repose, is a good example of spontaneity.

Spontaneous Combustion (spon-tā′ne-us). See *Combustion* (*Spontaneous*).

Spontaneous Generation. See *Generation* (*Spontaneous*).

Spontoon (spon-tön′), the half-pike formerly carried by infantry officers, and used for signaling orders to the regiment. Their use was discontinued in the British army in 1787.

Spoon (spön), a small domestic utensil of various materials, with a bowl or concave part and a handle, used at table for taking up and conveying to the mouth liquids and liquid food. Spoons, when made of silver or plated metals, are generally formed by stamping; while spoons of Britannia metal and similar fusible alloys are formed by casting in brass molds. Formerly great numbers of spoons were made of horn, and in rural localities such spoons are still in use. The old-fashioned *apostle-spoons* were so-called from bearing a figure of one of the apostles.

Spoonbill, the popular name of the birds of the genus *Platalea* belonging to the heron family

White Spoonbill (*Platalea leucorodia*).

(Ardeidæ), order Grallatores, from the shape of the bill, which is somewhat like a spoon, being curiously widened out at the tip. They live in society, in wooded marshes, generally not far from the mouths of rivers, and on the seashore. The white spoonbill (*P. leucorodia*) inhabits Europe. As winter approaches it migrates to the salt marshes on the Mediterranean coasts. The color is pure white, the breast being yellow, with a naked patch of skin on the throat; the legs are black, and the bill, which is about 8 inches in length, is black, and yellow at the tip. The roseate spoonbill (*P. ajāja*) is an American species, with the plumage of a fine rose color.— The name of spoonbill is also given to a kind of sturgeon (*Polyŏdon spatŭla*) found in the Ohio, Mississippi, etc. See *Paddle-fish.*

Spoon-worm, a name for various animals of the class worms or Anarthropoda, section Gephyrea, in particular *Thalassēma Neptūni*, so-called on account of the spoon-like appendage to the proboscis, around which is a circle of tentacula. It is much used as a bait by fishermen. All the species of this genus are remarkable for the wonderful power of contraction and expansion possessed by the skin, and the extraordinary manner in which they can alter their shape. Allied spoon-worms belong to the genus *Sipuncŭlus.* All are inhabitants of the sea.

Sporades (spor′a-dēz), the general name for a group of small islands in the Grecian Archipelago, lying to the east of the Cyclades. They belong partly to Greece and partly to Turkey. The principal are Scio, or Chios, Samos, Cos, Rhodes, Lesbos, and Patmos.

Sporadic (spo-rad′ik), applied to a disease which occurs in single and scattered cases as distinct from epidemic and endemic, when many persons are affected.

Sporangium (spo-ran′ji-um), in botany, the case in which the spores or reproductive germs of cryptogams are formed.

Spore (spōr), applied in zoölogy to the germs of many of the lowest classes of animals, such as Infusoria, which, together with plant spores, are borne in immense quantities by the atmosphere. The presence and nature of these spores has become of great importance in connection with the propagation of disease. See *Germ Theory.*

Spore, in botany, the reproductive body of cryptogamic plants. As a spore does not contain an embryo, but consists merely of one or more cells variously combined together, it is called

a *spore* to distinguish it from a true seed. Reproduction by spores is anticipated in the single-celled bacteria, algæ and fungi, where the vegetative body divides, each portion developing into an independent plant. In the higher algæ and fungi, spores are formed in special organs or sporangia. Propagation may be asexual or sexual. On the under surface of the fronds of ferns spore-cases may often be seen. These fall to the ground, producing a small green plant called the prothallium of the fern. This in turn produces the sex elements, from the union of which grows a new fern. This indirect mode of reproduction is called the alternation of generations. Spores are sometimes contained in asci or little sacs and called *sporidia.*

Sporozoa (spōr'o-zō-a), a class of *Protoza*, formerly synonymous with *Gregarinida*, but more comprehensive, including many organisms not usually classed with the gregarines. They are parasitic and occur in almost all mammals. Most are very minute. The forms which are found in human blood include those which produce malaria and the sleeping sickness.

Spot-lens, in optics, a condensing lens in a microscope, in which the light is confined to an annular opening, the circular middle portion being obstructed by a spot, which forms the dark background behind the semi-translucent illuminated object.

Spotswood (spots'wood), ALEXANDER, an American Colonial governor, born in Tangier, Africa, in 1672; died in Annapolis, Md., June 7, 1740. He entered the English army, fought at Blenheim, and in 1710–22 served as governor of Virginia, promoting its good in many ways. He was deputy postmaster-general, 1730–39 and greatly improved mail facilities.

Spotted Fever. See *Typhus Fever.*

Spottiswoode (spot'is-wụd), JOHN, Archbishop of St. Andrews, born in 1565; died in 1639. He was appointed archbishop of Glasgow (1603); afterwards (1615) he was transferred to the archbishopric of St. Andrews, and became primate of Scotland. In 1633 he crowned Charles I at Holyrood, and two years thereafter was made chancellor of Scotland. For his endeavors to force the liturgy and book of canons into Scotland he was deposed by an Assembly held at Glasgow in 1638, whereupon he removed to London. He is the author of a *History of the Church of Scotland*, beginning at 203 A.D. and brought down to the reign of James VI.

Spottiswoode (spot'is-wụd), ALICIA ANNA, a Scottish poet, the composer of *Annie Laurie* (in its recent form), *Douglas, Douglas, Tender and True*, and other popular songs. She was married in 1836 to Lord John Scott, but resumed her maiden name on succeeding to the estate of Spottiswoode in 1870.

Spottiswoode (spot'is-wụd), WILLIAM, mathematician and physicist, born at London in 1825; died in 1883. He was educated at Balliol College, Oxford. In 1845 he took a first class in mathematics, and in the following year became manager of his father's printing establishment. He was the author of *A Tarantasse Journey through Eastern Russia* (1857); *Meditationes Analyticæ*, a treatise on *The Polarization of Light;* several papers to the Geographical Society, one of which was on *Typical Mountain Ranges;* and a paper to the Astronomical Society on *A Method of Determining Longitude.* He was president of the Mathematical Society (1871), of the British Association (1878), and of the Royal Society (1879).

Spout-shell, a name sometimes given to the pelican's foot (*Aporrhais pes-pelĕcani*), a British mollusc; so-called from the manner in which the aperture of the shell is lengthened into a kind of spout in front. Also a name of several molluscs that squirt out water.

Sprague (sprāg), WILLIAM BUEL, an American clergyman and prolific writer, born at Andover, Connecticut, in 1795; died in 1876. He was graduated at Yale, studied at Princeton theological seminary, for forty years was pastor of the Second Presbyterian church at Albany, New York. He published many sermons, addresses, lectures, essays, letters, etc., but his principal work is *Annals of the American Pulpit* (1857-69).

Sprain (sprān), the violent straining or twisting of the ligaments and tendons which form the soft parts surrounding a joint. The ordinary consequence of a sprain is to produce some degree of swelling and inflammation in the injured part. The best treatment is to give the limb perfect rest, by means of splints or otherwise, and to foment the part for an hour or two with warm water. If the inflammation increases leeches should be applied. When this has passed the joints should be gently rubbed with a liniment of soap

and opium. The joint often remains weak and faint for a length of time, and too great caution cannot be observed in bringing it again into use.

Sprat, a small fish of the herring family, *Harengūla* (*Clupea*) *sprattus*. At one time the sprat was thought to be the young of the herring, pilchard, or shad; but it can be easily distinguished from the young of either of these fishes by means of the sharply-notched edge of the abdomen, the ventral fins beginning beneath the first ray of the dorsal fin, and by the want of axillary scales to the ventral fins. It is found in the North Atlantic and Mediterranean, and on coasts of the southern United States. It is considered as a delicious, well-flavored, and wholesome fish. It is also known by the name of *garvie*, or *garvie herring*.

Sprat-sucker (*Lernentŏma spratti*), a genus of parasitic crustaceans, belonging to the Lernæadæ (which see), and so named from its habits of infesting the eyes of sprats.

Spree (sprā), a river of North Germany, rises in the east of Saxony, enters the Prussian province of Brandenburg, passes the towns of Spremberg, Kottbus, Lübben, etc., traverses Berlin, and a little below Charlottenburg joins the Havel at Spandau, after a course of about 220 miles, of which over 100 is navigable. The Friedrich Wilhelm Canal connects it with the Oder a short distance above Frankfurt.

Spremberg (sprām'ber*h*), a town of Prussia, province of Brandenburg, on the Spree, with woolen and other manufactures. Pop. (1905) 11,188.

Spring, one of the four seasons of the year. For the northern hemisphere the spring season commences when the sun enters Aries, or about the 21st of March, and ends at the time of the summer solstice, or about the 22d of June. In common language, spring is usually regarded as commencing with March and ending with May. In the southern hemisphere the astronomical spring begins September 23, and ends December 21.

Spring, an outflow of water from the earth, or a stream of water at the place of its source. Springs have their origin in the water which falls upon the earth in the form of rain or snow, and sinks through porous soils till it arrives at a stratum impervious to water, where it forms subterranean reservoirs at various depths. When the pressure of the water which fills the channels through which it has descended is sufficient to overcome the resistance of the superincumbent mass of earth, the water breaks through the superficial strata and gushes forth in a spring; or it may find some natural channel or crevice by which to issue. In descending and rising through various mineral masses the water of springs often becomes impregnated with gaseous, saline, earthy, or metallic admixtures, as carbonic acid gas, sulphuretted hydrogen gas, nitrogen, carbonate of lime, silica, carbonate of iron, etc. When these substances are present in considerable quantity the springs become what are known as *mineral springs*. Warm and hot springs are common, especially in volcanic countries, where they are sometimes distinguished by violent ebullitions. (See *Geysers*.) Some springs run for a time and then stop altogether, and after a time run again, and again stop; these are called *intermittent springs*. Others do not cease to flow, but only discharge a much smaller quantity of water for a certain time, and then give out a greater quantity; these are called *variable springs*.

Spring, an elastic body, the elasticity of which is made practically available. Springs are made of various materials, as a strip or wire of steel coiled spirally, a steel rod or plate, strips of steel suitably joined together, a mass or strip of india-rubber, etc., which, when bent or forced from its natural state, has the power of recovering it again in virtue of its elasticity. Springs are used for various purposes — diminishing concussion, as in carriages; for motive power, acting through the tendency of a metallic coil to unwind itself, as in clocks and watches; or to communicate motion by sudden release from a state of tension, as the spring of a gun-lock, etc.; others are employed to measure weight and other force, as in the spring-balance, as regulators to control the movement of wheelworks, etc.

Springal (spring'al), an ancient warlike engine, used for shooting large arrows, pieces of iron, etc. It is supposed to have resembled the cross-bow in its construction.

Spring-balance, a contrivance for determining the weight of any article by observing the amount of deflection or compression which it produces upon a spiral steel spring properly adjusted and fitted with an index working against a graduated scale. See *Balance*.

Spring-beetles, the name of a group of beetles. See *Elater*.

Spring-bok, SPRING-BOC (*Antidorcas euchŏre*), a species of antelope nearly allied to the gazelle, found in vast herds in South Africa, and used as food by the colonists. It is a very beautiful animal, of graceful form and fine colors — fulvous brown on the upper parts, pure white beneath, with a broad band of deep vinous red where

Spring-bok (*Antidorcas euchŏre*).

the colors meet on the flanks. It is larger than the roebuck, and its neck and limbs much longer and more delicate. The horns curve in a lyre-shape, and are small in the female. It receives its name from its singular habit of leaping perpendicularly to the height of several feet. In 1896 a trek, or periodical migration, of these animals was seen in Cape Colony estimated to contain 500,000 head.

Springer (spring'er), in architecture, the impost or place where the vertical support to an arch terminates and the curve of the arch begins; or the lowest voussoir or bottom stone of an arch, which lies immediately upon the impost.

Springer, a name given to several varieties of the spaniel. The ears are long and pendulous, and the color usually white with red spots. It is employed to start or spring birds from coverts. The chief breeds are the Clumber, Sussex, and Norfolk. See *Spaniel.*

Springfield (spring'fēld), a city, capital of Hampden county, Massachusetts, situated on the left bank of the Connecticut, here navigable, about 98 miles W. by S. from Boston. It contains many fine churches and other buildings, and the streets are wide and planted with shade trees. It has an United States armory, established here in 1795 and the most extensive in the United States. In this large numbers of rifles are manufactured, and there is also a government arsenal capable of storing 300,000 stand of arms. The water-power furnished by Mill River is abundant. Products include the famous Springfield and other firearms, automobiles, skates, paper, clothing, corsets, knit goods, magnetos, electrical and automobile parts of many kinds, etc. It is notable for its two-million-dollar municipal group and extensive park system. Pop. (1910) 88,926; (1920) 129,563.

Springfield, the capital of Illinois, and county seat of Sangamon Co., 96 miles N. N. E. of St. Louis, 185 miles S. W. of Chicago, on seven railroads. Its notable edifices include the State capitol, erected at a cost of $4,500,000; the new Centennial building, State arsenal, the new Supreme Court building, the county court house, the Lincoln home, and the Lincoln tomb and monument. The city has 100 miles of paved streets and nearly 450 acres of parks, boulevards and playgrounds. The district is rich in coal mines and farm produce. It is an important horse-breeding center; here are the Illinois State Fair Grounds, costing $1,650,000. There are numerous manufactories, including the Illinois Watch Co.'s plant. Pop. (1910) 51,678; (1920) 59,183.

Springfield, a city, county seat of Greene Co., Missouri, in the Ozark Mountains. The great railroad shops and offices of the St. Louis & San Francisco R. R., employing 3000 men, are here. In the city are a large number of wholesale concerns which enjoy a vast trade territory. Its educational advantages are very great, it being the home of Drury College (opened 1873, 476 students); S. W. Missouri Teachers' College (founded 1905, 2560 students), etc. Pop. (1910) 35,201; (1920) 39,631.

Springfield, a city, county seat of Clark Co., Ohio, 45 miles W. of Columbus, on Big Four and other railroads. It has a splendid new high school building, a business university, and Wittenberg College (founded 1845). Memorial Hall seats nearly 3000. It has numerous manufactures, including iron castings, engines, agricultural machinery, pumps, radiators, and many other products. Pop. (1910) 46,921; (1920) 60,840.

Springfield, a town and village of Windsor Co., Vermont, on Black River, 37 miles S. E. of Rutland. Has machine shops, shoddy mills, etc. Pop. (1920) 7202.

Spring-tails, a family of apterous insects belonging to the order Thysanura, and distinguished by the possession of an elastic forked caudal appendage which is folded under the body when at rest, and by the sudden extension of which they are enabled to make leaps.

Spring-tide, the tide which happens at or soon after the new and full moon, which rises higher than common tides. At these times the sun and moon are in a straight line with the earth, and their combined influence in raising the waters of the ocean is the greatest. See *Tide.*

Spring Valley, a city of Bureau Co., Illinois, on the Burlington and other railroad routes, 19 miles w. of Ottawa. It has coal-mining industries. Pop. 7035.

Sprit, a small boom, pole, or spar which crosses the sail of a boat diagonally from the mast to the upper aftmost corner, which it is used to extend and elevate. Such a sail is called a *sprit sail.* The same name was formerly given to a sail attached to a yard under the bowsprit of large vessels.

Sprottau (sprōt'tow), a town of Prussia, province of Silesia, district of Liegnitz, at the confluence of the Sprotte with the Bober. Pop. 7846.

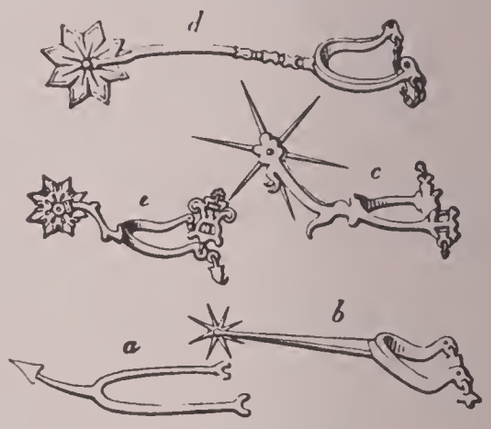
Spruce (sprös), the name given to several species of trees of the genus *Abies.* The Norway spruce-fir is *A. excelsa,* which yields the valuable timber known under the name of white or Christiania deal. It is a native of great part of Northern Europe and is a noble tree of conical habit of growth, reaching sometimes the height of 150 feet. The white spruce is *A. alba,* the black spruce-fir is *A. nigra,* both natives of North America. The latter attains the height of 70 or 80 feet, with a diameter of from 15 to 20 inches. Its timber is of great value on account of its strength, lightness, and elasticity, and is often employed for the yards of ships and the sides of ladders. From the young shoots is extracted the *essence of spruce,* a decoction used in making spruce beer. The hemlock spruce-fir is the *A. canadensis,* a noble species, rising to the height of 70 or 80 feet, and measuring from 2 to 3 feet in diameter. It grows abundantly over great part of Canada and part of the United States. The wood is employed for laths, fences, coarse indoor work, etc. The bark is exceedingly valuable for tanning. Douglas' spruce or fir, the *A. Douglasii* of North-western America, is a noble tree, reaching a height of 100 to 180 feet in its native forests.

Spruce-beer, a fermented liquor made from the leaves and small branches of the spruce-fir or from the essence of spruce, boiled with sugar or molasses, and fermented with yeast. There are two kinds, the brown and the white, of which the latter is considered the best, as being made from white sugar instead of molasses. Spruce-beer forms an agreeable and wholesome beverage, and is useful as an antiscorbutic.

Spunging-house. See *Sponging-house.*

Spun-yarn, a small line or cord, formed of two, three, or more rope-yarns twisted together. The yarns are usually drawn out of the strands of old cables, and knotted together. Spun-yarn is used for various purposes, as serving ropes, weaving mats, etc.

Spur, an instrument having a rowel or small wheel with sharp points, worn on a horseman's heel, and used for goading the horse. In early times it took the simple form of a sharp-pointed goad, the rowel first appearing in the end of the thirteenth century. Spurs were



Ancient Spurs.

a, Frankish Spur (tenth century). *b,* Brass Spur (time of Henry IV). *c,* Long-spiked rowel Spur (time of Edw. IV). *d,* Long-necked brass Spur (time of Henry VII). *e,* Steel Spur (time of Henry VIII).

especially the badge of knighthood. Hence, *to win one's spurs,* was to become a knight, and the phrase is now used to indicate the achievement of distinction in one's profession.

Spurge (spurj), the common name of the different species of plants of the genus *Euphorbia.* They abound with an acrid milky juice. The caper-spurge is the *E. Lathyris,* the oil of the seeds of which is a substitute for croton-oil; the flowering spurge is the *E. Corollata,* in Canada and United States; the petty spurge is the *E. Peplus,* once used as a powerful purgative. See *Euphorbiaceæ.*

Spurge-laurel, the *Daphne Laureola,* a shrub which possesses acrid properties, generally flowering in March and April. See *Daphne.*

Spurgeon (spur'jn), CHARLES HADDON, evangelist, was born at Kelvedon, Essex, England, in 1834. He began to preach in London about 1853 and attracted large audiences by his eloquence and popular style of oratory. A new chapel, of great dimensions, was opened for him in 1861. Besides his ordinary ministrations he founded the Pastors' College, the Stockwell Orphanage, the Colportage Association, a Book Fund, Supplementary Pastors' Aid Fund, almshouses, schools, etc. He published several religious works, besides many volumes of sermons. He died January 31, 1892.

Spurn Head, a headland in the S. E. of Yorkshire, at the mouth of the Humber, 8 miles east of Grimsby. On the point are two lighthouses with fixed lights, and off the point is a light-vessel with revolving light.

Spurred Rye. See *Ergot.*

Spurrey (spur'i), the common name for *Spergula,* a genus of plants, natural order Caryophyllaceæ. The species are found in fields and cultivated ground, especially on sandy soils, all over the world. They have slender stems, very narrow often whorled leaves, and small white fine-petaled flowers. *S. arvensis* (corn-spurrey or yarr) is a well-known plant growing in cultivated grounds from Canada to the State of Georgia. Cattle and sheep are fond of it; hens also eat it, and are said to lay a greater number of eggs in consequence.

Spur-royal, a gold coin, first made in the reign of Edward IV. In the reign of James I its value was 15*s.* It was so named from having on the reverse a sun with four cardinal rays issuing from it so as to suggest a resemblance to the rowel of a spur. Sometimes written *spur-rial* or *spur-ryal.*

Spur-wheel, in machinery, a wheel in which the teeth are perpendicular to the axis, and in the direction of radii. A train of such wheels working into each other is called *spur-gear.*

Spur-wing, the common name for a species of wading birds of the genus *Parra* (see *Jacana*), having the wing armed with a bony spur. They inhabit Africa and South America. The name is also given to the species of geese of the genus *Plectroptĕrus.* They are natives of Africa, and have two strong spurs on the shoulder of the wing.

Spurzheim (spŭrts'hīm), JOHANN FRIEDRICH KASPAR, a German phrenologist, born at Treves, in 1776; died in 1832. He received a medical education at Vienna, where he became acquainted with Dr. Gall, who at this time began to teach his doctrine of phrenology, and with whom he traveled on a lecturing tour (1805) through Germany, France, and Denmark. In 1813 Spurzheim visited England alone, where he popularized the new doctrine. He went to America in 1832, and it was while lecturing in Boston that he died. Among his published writings are: *The Physiognomical System of Drs. Gall and Spurzheim* (1815); *Essai Philosophique sur la Nature Morale et Intellectuelle de l' Homme* (1820); *Elementary Principles of Education* (1821), and the *Anatomy of the Brain* (1826).

Spy, a secret emissary sent into an enemy's camp or territory to inspect their works, ascertain their strength and their intentions, to watch their movements, and report thereon to the proper officer. By the laws of war among all civilized nations a spy is subjected to capital punishment.

Spy-Wednesday, an old name given to the Wednesday immediately preceding Easter, in allusion to the betrayal of Christ by Judas Iscariot.

Squad (skwod), a small body of troops assembled for drill, inspection, or other purposes. The *awkward squad* is composed of those recruits who have not received sufficient training to take part in regimental drill.

Squadron (skwod'run), the principal division of a regiment of cavalry. The actual strength of a squadron varies with that of the component troops, but it ranges from 120 to 200 sabers. A squadron is divided into two troops, each of which is commanded by its captain. Each regiment of cavalry consists of three or four squadrons. The term is applied also to a division of a fleet, being a detachment of ships of war employed on a particular service or station, and under the command of a commodore or junior flag-officer.

Squalidæ (skwa'li-dē), a family of elasmobranchiate fishes, which includes the various species of sharks. The type of this family is the Linnæan genus *Squalus.* See *Shark.*

Squamata (skwa-mā'ta), the division of reptiles comprising the Ophidia (snakes) and Lacertilia (lizards), in which the integument develops horny scales, but there are no dermal ossifications.

Squamipennes (skwa-mi-pen'ēz), a family of acanthopterygious (teleostean) fishes, so-named on account of their fins being covered

with scales, not only on the parts which have soft rays, but frequently also on those that have spinous ones. They are chiefly small fishes, abundant in the seas of hot climates, and of the most beautiful colors. They frequent rocky shores, and their flesh is, generally speaking, very wholesome and palatable. Called also *Chætodontidæ*.

Square, in geometry, a quadrilateral figure, both equilateral and equiangular, or, in other words, a figure with four equal sides and equal angles. In measuring superficial areas it is only necessary to multiply one side by itself to have the area of the square, because each of the sides may be considered as the basis or as the perpendicular height. Thus a square the sides of which measure 4 feet is equal to 16 square feet, that is, sixteen squares each 1 foot high and 1 foot long. To *square* a figure (for example, a polygon) is to reduce the surface to a square of equivalent area by mathematical means. It has often been attempted to square the circle, but this cannot be done. In arithmetic and algebra the *square* of a number is the number or quantity which is produced by multiplying a number or quantity by itself. Thus 64 is the square of 8, for $8 \times 8 = 64$.

Square, in military tactics, a body of infantry formed into a rectangular figure with several ranks or rows of men facing on each side, with officers, horses, colors, etc., in the center. The front rank kneels, the second and third stoop, and the remaining ranks (generally two) stand. This formation is usually employed to resist a cavalry charge. Hollow squares are frequently formed with the faces fronting inwards when orders and instructions, etc., are to be read, and the like.

Square Root, in mathematics, one of two equal factors of a given number. Thus 2 is the square root of 4, x of x^2. The following illustrates the method of finding the square root of 576, which is 24:

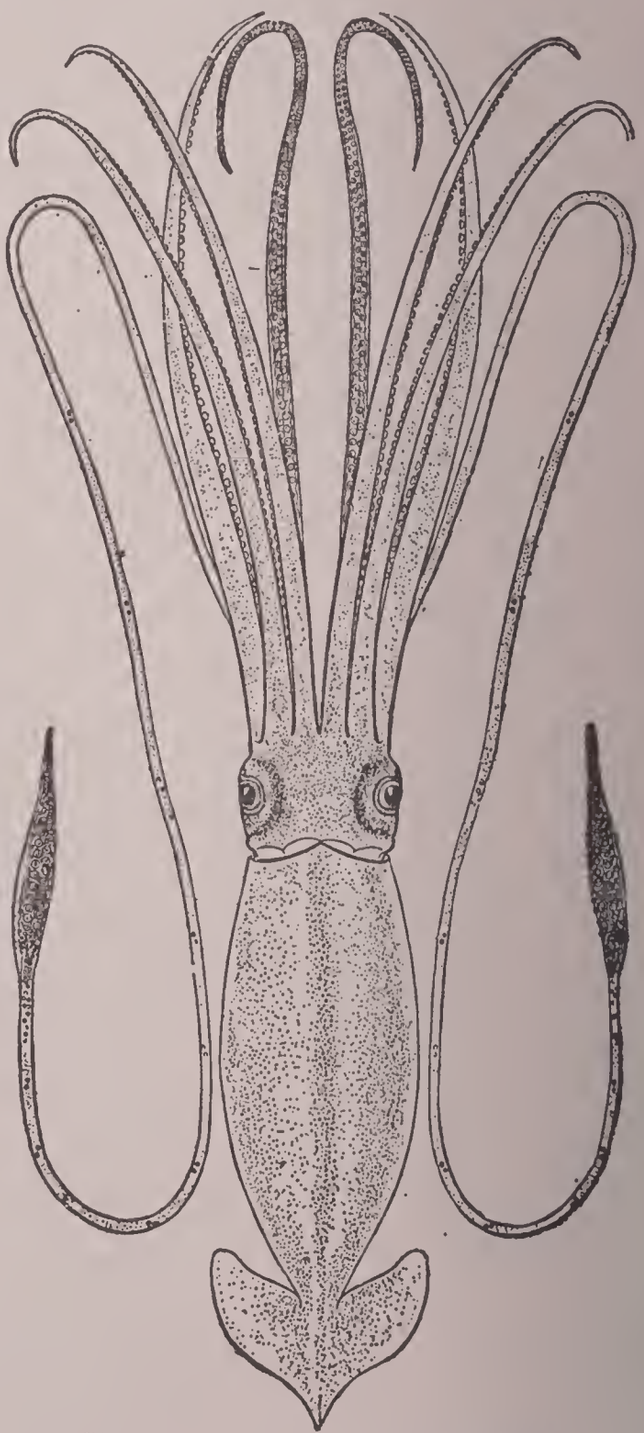
$$\begin{array}{rl} & \sqrt{576}\ (20 \\ & 400 \quad\ 4 \\ \hline 2 \times 20 = 40) & 176 \quad 24 \\ (40 + 4) \times 4 = & 176 \end{array}$$

Squash, a plant of the genus *Cucurbita* (*C. Melopepo*) and its fruit, cultivated in the United States as an article of food. The name is also given to other species. See *Gourd*.

Squash-bug, a name given in North America to several hemipterous insects, best known as destroyers of squash, pumpkin, and other plants.

Squatina (skwa-tē'na), a genus of cartilaginous fishes somewhat akin to the rays. The *S. angelus* is the angel-fish or monk-fish. See *Angel-fish*.

Squatter (skwät'er), a person that settles on a piece of land, particularly on public land, without a title. In Australia the term is also applied to one who occupies an unsettled tract of land as a sheep-farm under lease from government at a nominal rent.



Giant Squid (*Architeuthis princeps*).

The word is sometimes used in a looser and wider sense.

Squaw-root, a singular scaly plant (*Conopholis americāna*, nat. order Orobancheæ), a native of America, found growing in clusters among fallen leaves in oak woods.

Squeteague (skwe-tēg′), an American fish, the *Otolithus regālis* of Cuvier, very common in the waters of Long Island Sound and adjacent bays, where it is captured in large quantities for the table. It produces a dull sound like that of a drum.

Squib, a little pipe or hollow cylinder of paper filled with gunpowder or other combustible matter which being ignited it flies along, throwing out a train of fiery sparks, and bursting with a crack.

Squid, a popular name of certain cuttle-fishes belonging to the dibranchiate group of the class Cephalopoda, and included in several genera, of which the most familiar is that of the calamaries. See *Calamary*.

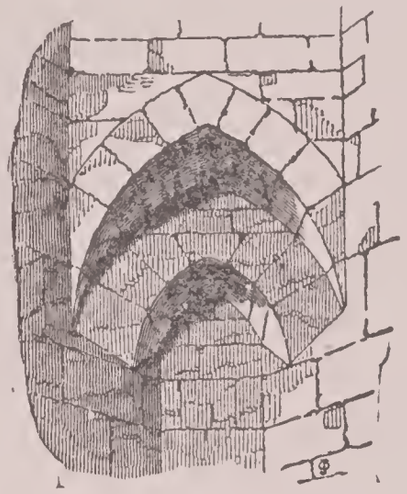
Squier (skwī′er), Ephraim George, archæologist, born at Bethlehem, Pennsylvania, in 1821; died in 1888. His work as an archæologist began with an account of the ancient monuments of the Mississippi valley and those of New York. They were followed by studies of the same kind in Nicaragua, Central America and Peru. His works were highly esteemed by scientists and he was admitted to many of the learned societies of Europe.

Squill, a plant of the genus *Scilla*, nat. order Liliaceæ, nearly allied to the hyacinths, onions, etc. The term squill is more particularly applied to the *Scilla maritima* (*Urginea Scilla*), officinal squill or sea-onion, which has a large acrid bulbous root like an onion. It is a native of the sandy shores of the Mediterranean. The bulb has been known as a medicine from the earliest ages, and is still used as a diuretic and expectorant. In large doses it causes vomiting, purging, and may even prove fatally poisonous.

Squill (*Scilla maritima*).

Squilla (skwil′la), a genus of crustaceans, order Stomapoda, the type of the family Squillidæ, having the body long and semicylindric, somewhat resembling that of a lobster. The shell consists of a single shield of an elongated quadrilateral form, covering the head, the antennæ and eyes excepted, which are placed on a common anterior articulation. The best known of the numerous species is the locust shrimp, mantis-crab, or mantis-shrimp (*S. mantis*) of the Mediterranean.

Squinch, Sconce, in architecture, a small pendentive arch (or several combined) formed across an angle, as in a square tower to support the side of a superimposed octagon.



Squinch, Maxstoke Priory, Warwickshire.

Squint, in architecture, an oblique opening passing through the walls of many old churches, usually constructed for the purpose of enabling a person in the transepts or aisles to see the elevation of the host at the high altar. Generally they are not above a yard high and 2 feet wide, but sometimes they form narrow arches 10 or 12 feet in height, as at Minster-Lovell, Oxfordshire. The name *hagioscope* is sometimes applied to them.

Squinting, or Strabismus, a defect of the eyes owing to which they cannot both be brought to bear upon the same object at once. It is usually due to one of the lateral muscles of the eye having a longer pull than the other. It may also arise from paralysis of one muscle caused by a blow. There are several kinds of squint, the two chief being inward or convergent and outward or divergent, the axes of the eyes in the one case tending to meet, in the other to separate. For persons so affected, and especially children, it is well not to look too long at small objects or read in ill-lighted rooms, and glasses to correct the sight should be obtained. It is also a good thing to have the sound eye (when there is but one squinting eye) bandaged up for a short

time each day. When these measures fail the muscle can be lengthened by means of a simple surgical operation.

Squirrel (skwir'el), a small rodent mammal of the family Sciuridæ, the type of which is the genus *Sciurus*, or true squirrels. This family comprehends three groups—the true squirrels (*Sciurus*), the ground-squirrels (*Tamias*), and the flying-squirrels (*Pteromys* and *Sciuptcrus*). The true squirrels are distinguished by their strongly compressed inferior incisors and by their long bushy tail. They have four toes before and five behind. The thumb of the forefoot is sometimes marked by a tubercle. They have in all four grinders, variously tuberculated, and a very small additional one above in front, which very soon falls. In color they are usually of a rich ruddy brown on the upper parts, merging into reddish or grayish-white on the under parts of the body, but the fur varies with the season and climate so that in winter it may be of a gray appearance. The head is large, and the eyes projecting and lively. The red squirrel of North America (*Seiurus hudsonicus*) is about 14 inches long, very active and is also called pine squirrel and chickaree. The American gray squirrel (*S. carolinensis*) is larger and a black variety occurs in many localities. The fox squirrel (*S. niger*) is the largest of the genus, being 26 inches long and is rufous in color. The latter two species are much hunted for their flesh. The Abert and Kaibab squirrels (*S. aberti* and *S. kaibabensis*) are Rocky Mountain forms, closely related and very similar, with long, pointed ear tufts and beautiful coloration. The Douglass squirrel (*S. douglasi*) inhabits the Pacific coast region of North America and is similar to the eastern chickaree. The ground squirrels are commonly called chipmunks; the common eastern American form (*Tamias striatus*) lives in burrows in the ground, as do also its many brightly colored western relatives. The flying squirrel of America (*Glaucomys volans*) is a beautiful little creature, with close relatives throughout the circumpolar regions of the Old World. The common squirrel of Europe (*Seiurus vulgaris*) resembles the American gray squirrel, but is smaller and has prominent tufts on the ears. The fur of the Siberian variety is much valued. Squirrels build nests of leaves in the tops of trees, or in holes in trunks or branches and they live on nuts, roots, buds, seeds, certain insects and birds' eggs.

Squirrel-corn, the American name for the fragrant plant *Dicentra canadensis*.

Squirrel-monkey, a small American monkey of the genus *Chrysothrix*. It resembles in general appearance and size the familiar squirrel. A well-known species is the *C. Seiureus* of Brazil, which is colored grayish-olive, the under surface being gray, the ears white, and the tail tipped with black.

Srinagar (srē-nu-gär'), a city, the capital of the state of Cashmere, in the western Himalayas, situated in the valley of Cashmere, on both banks of the Jehlum, at an elevation of over 5000 feet. The city extends along the river for about two miles, and is exceedingly picturesque. The Jama Masjid, a large mosque said to be capable of containing 60,000 persons, is situated in the city. Pop. 141,631.

Stabat Mater (stā'bat mā'tėr; L. 'the mother stood'), the first words, and hence the name, of a mediæval hymn still sung in the ecclesiastical services of the Roman Catholic Church during Holy Week, and at the festival of the Seven Dolors of the Virgin Mary. It was written in 1268 by an Italian Franciscan friar named Jacobus de Benedictis. It has been set to music by Rossini, Dvorák, and other famous composers.

Stability (sta-bil'i-ti), in physics, a term applied to that condition of a body in which, if its equilibrium be disturbed, it is immediately restored, as when the center of gravity is below the point of support. See *Equilibrium*.

Stable Fly, the *Stomoxys calcitrans*, much like the common house fly and frequently mistaken for it in spite of its different habits, structure and distribution. The adult fly feeds exclusively on blood, biting various animals, and less frequently human beings. It does not enter houses as frequently as does the house fly. It appears early in the spring and becomes much more abundant after midsummer, persisting in considerable numbers until later in the fall.

Staccato (stak-kä'tō), in music, disconnected; separated; a direction to perform the notes of a passage in a crisp, detached, distinct, or pointed manner. It is generally indicated by dots or dashes placed over the notes. A certain amount of time is subtracted from the nominal value of any staccato note.

Stachys (stak'is), a genus of plants belonging to the nat. order Labiatæ. The species are very numerous, and are widely distributed through the temperate regions of the globe. Several species are natives of the United States.

Stack-stand, a base nent of wood or iron raised on props (of iron, stone, or wood), on which a stack, especially a stack of some kind of grain, is built for the purpose of keeping it dry or excluding vermin. There is usually also a hollow upright cone of wood or iron to assist in ventilating the interior of the stack.

Stacte (stak'tē), one of the sweet spices which composed the holy incense of the ancient Jews. Two kinds have been described, one the fresh gum of the myrrh-tree (*Balsamodendron Myrrha*), mixed with water and squeezed out through a press; the other kind, the resin of the storax (*Styrax officinale*), mixed with wax and fat. Exod. xxx, 34.

Stade (stä'de), a town of Prussia, province of Hanover, on the Schwinge, about 4 miles above its confluence with the Elbe, 21 miles west of Hamburg. It has some shipping and trade. The Stade dues, a toll charged on all cargoes shipped to Hamburg, used to be levied here until they were abolished in 1861. Pop. (1905) 10,837.

Stadium (stā'di-um), a Greek measure of 125 paces, or 625 Roman feet, equal to 606 feet 9 inches English; consequently the Greek stadium was somewhat less than our furlong. It was the principal Greek measure of length. This term was also applied to the course for foot-races at Olympia in Greece, which was exactly a stadium in length. The name was also given to all other places throughout Greece wherever games were celebrated.

Stadtholder (stat'hōl-dėr; Dutch, *Stadhouder*, 'city-holder'), a title given in the Netherlands to a governor of a province who was also commander-in-chief of the forces. This title, however, received its special significance in 1580, when the provinces of Holland and Zealand revolted against the authority of Spain, and unitedly accepted William, Prince of Orange, as their stadtholder. The prince was assassinated before he was formally invested with this office, but the title was conferred on his son, Prince Maurice, and remained as the hereditary title of the chief of the state until Holland was annexed by France in 1802. This title was finally dropped in 1814, when the Prince of Orange was recalled from England and declared king of the Netherlands by an assembly of notables. See *Netherlands.*

Staël-Holstein (stål-hol'stīn), Anne Louise Germaine Necker, Baroness de, the only child of Necker, Swiss banker and minister of finance to Louis XVI, was born in 1766; died in 1817. Her education was directed with puritanical severity by her mother, but this was counteracted by the tender indulgences of her father, who encouraged his daughter to converse with the eminent philosophers who frequented his house. In 1786 she published *Sophia*, a comedy, and two tragedies entitled *Lady Jane Grey* and *Montmorency;* while in this same year she married Baron de Staël-Holstein, Swedish ambassador at the French court. The marriage was not very happy, and she lived for a time apart from her husband. In 1788 she printed her *Lettres sur les Écrits et le Caractère de J. J. Rousseau.* At the outbreak of the revolution (1789) she exercised considerable political power by reason of her father's high position at court and her own wit and womanly charm; but during the Reign of Terror she fled to Coppet (1792), her father's estate in Switzerland, after vainly endeavoring to save her friends and the royal family. In 1793 she sought refuge in England, where she published *Reflections on the Trial of the Queen,* and *Reflections on the Peace.* During the Directory Madame de Staël-Holstein returned to Paris, where she again became an influence in politics, and published her essay on *The Passions.* Subsequently she was banished by Napoleon on account of her bold advocacy of liberal views, and her wanderings through Europe are described in her *Ten Years of Exile* (*'Dix Années d'Exil'*). Her other writings comprise *De la Littérature Considérée dans ses Rapports avec les Institutions Sociales; Delphine* (1802); *Corinne, ou l'Italie* (1807), a novel in which Italian life and scenery are exhibited with thorough knowledge, her most popular work; a work on Germany, *De l'Allemagne* (1810), which shows a want of understanding and appreciation of the German character; and *Considérations sur les Principaux Événements de la Révolution Française* (1818), etc. Her husband, the baron, died in 1802, but it was found at her death that she had secretly married a M. de Rocca in 1812.

Staff, a body of officers whose duties refer to an army or regiment as a whole, and who are not attached to particular subdivisions. Thus in the American army a general's staff consists of six aids, each with the rank of cavalry colonel; that of a lieutenant general of two aids and a military secretary, ranking as lieutenant colonels of cavalry; of a major-general of three aids, ranking as captains or lieutenants; of a brigadier-gen-

eral of two aids, ranking as lieutenants. The army of the United States, as recently reorganized, is under the command of a general staff, the Chief of Staff being Major General Leonard Wood. The staff of the British army includes the general officers commanding divisions, district brigades, etc.; — the officers of the quartermaster-general's and the adjutant-general's departments, called the *general staff;* — officers attached to commanding general officers as military secretaries and aids-de-camp, called the *personal staff;* — officers employed in connection with the civil departments at the war office; and those engaged in recruiting and garrison work.

Staffa (staf'fà), a small uninhabited island of the Hebrides, belonging to Argyleshire, situated about 55 miles w. of Oban by steamer; 1½ miles in circuit; greatest height, 144 feet. The island is covered by a rich soil affording excellent pasture, but it is best known because of its precipitous basaltic cliffs rising in columnar form, and its caves. The largest of these, Fingal's, or the Great Cave, has an entrance 66 feet high at mean tide, a breadth of 42 feet at entrance, and extends backwards 227 feet. Its sides are composed of basaltic columns, from the roof hang clusters of short columns whitened by calcareous stalactite, while the floor is covered by the sea to the depth of 18 feet at the entrance.

Stafford (staf'furd), a town, with borough of Stafford Springs, in Tolland Co., Connecticut, on Willimantic River. It has mineral springs and woolen mills, etc. Pop. 5407.

Stafford (staf'furd), a municipal and parliamentary borough of England, the county town of Staffordshire, situated on the River Sow, about 130 miles N. W. of London. It is pleasantly situated and well built; has a county-hall, free library, museum, and a theater; while its chief places of interest are the two old churches of St. Mary and St. Chad. The principal industries are the making of boots and shoes, brewing, and tanning. Pop. 23,385. The county is one of the central counties of England, and has an area of 1170 sq. miles. The surface in the north consists chiefly of wild moorlands, rising in several parts more than 1000 feet above sea-level, while the midland and southern parts consist for the most part of level and fertile lands. The Trent traverses the county from northwest to southeast. There are two valuable coal-fields — one in the north called the Pottery coal-field, and the other in the south, usually known as the Dudley coal-field, which is remarkable for the thickness and richness of its seams. The chief industries are coal-mining, iron-ore mining, smelting and manufacturing, and North Staffordshire is the chief center in the kingdom for the various earthenware manufactures. The county is well-supplied with railways and canals. Capital, Stafford. Pop. 1,359,718.

Stag, or RED-DEER, a large and handsome deer (*Cervus elăphus*) which is a native of Europe and Northern Asia. In summer the back and flanks of the stag are of a reddish-brown color, while these parts in winter are gray-brown. A full-sized male stag with antlers well developed stands about 4 feet high at the shoulder, and has horns 3 feet in length, while the female is smaller and has no horns. They feed on grass, buds and young shoots of trees, and in winter they roam in herds. The male is known distinctively as the hart (or stag), the female as the hind. The stag is represented in North America by the wapiti (*Cervus canadensis*), a larger species. See *Wapiti.*

Stag-beetle, a name of lamellicorn beetles of the genus *Lucānus*, family Lucanidæ. The common stag-beetle (*Lucānus cervus*) is a characteristic species of the group, and

Stag-beetle (*Lucānus cervus*).

is especially distinguished by the enormous size of the horny and toothed mandibles in the males. It is seen flying about in the evening, in the middle of summer, especially around oak trees.

Stage (stāj), a platform elevated above the ground, and specifically applied to the raised floor upon which theatrical performances are exhibited. See *Theater.*

Stage-coach. See *Coach.*

Staggers (stag'erz), the vague and popular name of certain diseases of horses and sheep. In the horse *mad* or *sleepy* staggers is due to inflammation of the brain, while *grass* or *stomach* staggers arises from acute indi-

gestion, generally the result of overfeeding on wet grass. In sheep the staggers is caused by the presence within the brain of the immature embryo of a species of tape-worm (*Tænia Cœnurus*), which, in its mature state, is found in the intestines of the dog.

Staghound, a large and powerful kind of hound formerly used in Europe for hunting the stag or red-deer, and now nearly extinct. It was bred, as is supposed, from the bloodhound and greyhound. The modern staghound is a variety of the foxhound.

Stahl (stäl), Friedrich Julius, born at Munich in 1802; died in 1861. He was educated at Würzburg, Heidelberg, and Erlangen, and became professor of jurisprudence in the latter place, and at Berlin in 1840. Here he made his mark as an ecclesiastical lawyer. He was a leader of the aristocratic party in the Prussian diet, and the author of *Die Philosophie des Rechts, Ueber den Christlichen Staat*, and *Was it Revolution?*

Stahl, Georg Ernst, a German physician and chemist, born in 1660; died in 1734. He studied at Jena in 1687, became physician to the Duke of Saxe-Weimar; in 1691 was chosen second professor of medicine at Halle; and in 1716 was appointed physician to the King of Prussia. Stahl was the author of a theory that there resides in the human body a vital force composed of pure fire, and this element he named *phlogiston*. This theory and the medical treatment founded upon it were discredited by the discoveries of Priestley and Lavoisier. His principal works are *Experimenta et Observationes Chymicæ et Physicæ; Disputationes Medicæ; Theoria Medica vera; Fundamenta Chymiæ Dogmaticæ et Experimentalis.*

Stahr (stär), Adolf Wilhelm Theodor, German writer, born in 1805; died in 1876. He was educated at Halle, and was for a number of years co-rector of the gymnasium at Oldenburg, but later resigned this post on account of ill health, and settled in Berlin. His earlier works were connected with Aristotle and his philosophy, but subsequently his literary activity extended over a wide field. His works include translations from Aristotle; books on art, travel, and literary and general history, as *Torso: Art, Artists, and Art-works of the Ancients; Lessing, His Life and Works; Goethe's Female Characters; The Prussian Revolution; Weimar and Jena; A Year in Italy; Paris Studies; A Winter in Rome; Pictures from Antiquity*, etc. In 1854 he married Fanny Lewald, who was also known as an authoress.

Stained-glass is glass painted with metallic oxides or chlorides, ground up with proper fluxes and fused into its surface at a moderate heat. See *Glass-painting.*

Stainer (stān'er), Sir John, an eminent English musician, born in 1840; died in 1901. He was graduated a Mus. Doc. from Oxford and in 1872 became organist at St. Paul's, London. He won fame as a brilliant performer on the organ, and wrote some excellent music, and works on harmony, etc.

Staines (stānz), an old market-town of England, in Middlesex, on the Thames, 6 miles from Windsor, and about 19 miles s. w. of London. Pop. 6688.

Stair, Lord. See *Dalrymple, James* and *John.*

Stairs, a succession of steps raised one above the other, affording means of communication between two points at different heights in a building, etc. Originally the stairs were placed from story to story in straight flights like ladders, and were often external, being sheltered by a projection from the roof, but to save space the spiral form was adopted, the stair being contained in a cylindrical building projecting from the outside of the edifice. In this construction a central axis or *newel* reaching from the ground to the roof serves to support the inner ends of the steps, and the outer ends are let into the walls. The spiral form is still used in certain circumstances; but the finest stairs are now constructed in straight sections separated from each other by a wide step or platform called a *landing.* The separate division, open space, or apartment in which the stair is placed is called the *staircase.*

Stake-net, a form of net for catching salmon, consisting of a sheet of network stretched upon stakes fixed into the ground, generally in rivers or firths, where the sea ebbs and flows, with contrivances by which the salmon become entangled in the net and are thereby secured.

Stalactites (sta-lak'tīts), masses of calcareous matter, usually in a conical or cylindrical form, pendent from the roofs of caverns, and produced by the filtration of water containing particles of carbonate of lime through fissures and pores of rocks. Similar masses of small size are frequently to be seen also depending from stone bridges. The water being evaporated leaves a deposit of lime behind it, which, by the continued trickling of the water,

gradually increases in size. Simultaneously with the formation of the stalactite a similar but upward growth, called a stalagmite, takes place at the spot vertically below where the successive drops of water fall and evaporate. This sometimes forms continuous sheets over the surface, sometimes rises into columns, which meet and blend with the stalactites above. Stalactites, by the strange and interesting forms which they often assume and their white color are frequently of great beauty. Famous examples in the United States and those of Mammoth Cave, in Kentucky, and Luray Cave, in Virginia.

Stalactite, section showing layers of growth.

Staleybridge. See *Stalybridge.*

Stalimene (stȧ-lim'e-nā). See *Lemnos.*

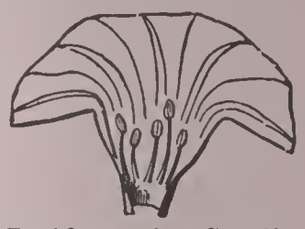
Stalk-eyed Crustacea, in zoology, applied to certain crustacea named Podophthalmata, which have the eyes set at the end of footstalks of variable length. The lobster, shrimp, and crab are examples of this group.

Stall (stȧl), a fixed seat inclosed, either wholly or partially, at the back and sides, in the choir or chancel of a cathedral, collegiate church, etc., and mostly appropriated to some dignitary of such churches.

Stalybridge (stā'li-brij), or STALEYBRIDGE, a municipal and parliamentary borough of England, in the counties of Lancaster and Chester, 7½ miles east of Manchester, on both banks of the Tame. The principal public buildings are the town-hall, the market-hall, the people's institute, the Oddfellows' hall, and St. George's church. Spinning cotton yarns and weaving calicoes are the principal manufactures; but there are also iron-foundries, machine and mill-wright shops, and paper-mills. Pop. (1911) 26,514.

Stamboul. See *Constantinople.*

Stamens (stā'menz), in botany, the male organs of fructification in plants, formed principally of cellular tissue. They are situated immediately within the petals, and are each composed, in most cases, of three parts, the filament, the anther, and the pollen (contained in the anther), of which the two latter are essential, the other not. The stamens and pistils constitute the sexual or reproductive organs of plants. Generally they both exist in the same flower, which is thus said to be *hermaphrodite* or *perfect.* The number of stamens varies in different plants, from one to a hundred or more. With respect to their directions they are named *erect, inflexed, reflexed, spreading, ascending, declinate;* and their insertions with regard to the ovary are said to be *hypogynous, epigynous,* or *perigynous.* It was on the number of stamens and their arrangements and relations that Linnæus founded the classes of his sexual system of plants. See *Botany, Anther, Pollen.*



Inside of Corolla, showing the stamens.

Stamford (stam'furd), a market town and municipal borough of England, partly in Northamptonshire and partly in Lincolnshire, on the Welland, about 12 miles northwest from Peterborough. It is an ancient and irregularly built town, containing interesting churches, of which St. Mary's (erected at the end of the thirteenth century) exhibits some fine specimens of early English architecture, and St. John the Baptist's (middle of the fifteenth century) has a fine wooden roof and screen. There are manufactures of agricultural implements, and a considerable trade on the Welland. Pop. 9646.

Stamford, a city of Fairfield Co., Connecticut, near the mouth of the Mill River, 33 miles northeast of New York, for the inhabitants of which it is a favorite summer resort. It has a good harbor for vessels of light draft. Its manufactures are of importance, and include large dye-stuffs, chocolate, pianos, machinery, typewriters, ranges, etc. Pop. (1910) 28,836; (1920) 40,057.

Stammering (stam'er-ing), an affection of the faculty of speech characterized by irregular, imperfect, or spasmodic actions of the muscles concerned in articulation. It

manifests itself in a difficulty in beginning the enunciation of words, especially such as begin with an explosive consonant, or in a spasmodic and for a time an uncontrollable reiteration of the same syllable after the word is begun; this latter defect being also called *stuttering*. Stammering is always increased by emotional disturbance, and is much mitigated, and often cured, by the patient acquiring confidence in himself, never attempting to speak in a hurry or when the chest is empty of air, or by reading measured sentences slowly and with deliberation.

Stamp, a term specifically applied to the public mark or seal made by a government or its officers upon paper or parchment whereon private deeds or other legal agreements are written, and for which certain charges are made for purposes of revenue. The name is also applied to a small piece of stamped paper issued by government, to be attached to a paper, letter, or document liable to duty. See *Stamp Tax*.

Stamp Act, an act for regulating the imposition of stamp duties; especially, an act passed by the British parliament in 1765, imposing a duty on all paper, vellum, and parchment used in the American colonies, and declaring all writings on unstamped materials to be null and void. This act roused a general opposition in the colonies, and was an inciting cause of the Revolution.

Stamp, POSTAGE, the stamp issued by government to affix to letters and other mailable matter, as an indication that the postage has been paid. The stamps issued by different countries are so numerous and varied that the collecting of them has become an ardent vocation with many persons, large collections being made.

Stamp Tax, a tax or duty imposed on pieces of parchment or paper, on which many species of legal instruments are written. (See *Stamp.*) The internal revenue acts of the United States of 1862, etc., required stamps for a great variety of subjects, under severe penalties in the way of fines, and invalidating of written instruments; stamp-taxes were also imposed in consequence of the war of 1898, and stamps for various purposes are still in use. In Britain stamp taxes on legal instruments used to be chiefly secured by prohibiting the reception of them in evidence unless they bore the stamp required by the law. By the Customs and Inland Revenue Act (1888), however, the non-stamping of bonds, conveyances, leases, mortgages, or settlements, is held to be an offense punishable by a fine of £10.

Standard (stan'dard), a flag or carved symbolical figure, etc., erected on a long pole or staff, serving as a rallying-point or the like. In a more strict sense the term is applied to a flag which bears the arms, device, or motto of the owner, long in proportion to its depth, tapering towards the fly, and, except when belonging to princes of the blood-royal, slit at the end. The so-called British royal standard is more correctly a banner, being a square flag. The flag of the United States has thirteen horizontal stripes, alternate red and white; on the admission of a new State one star is added to the union of the flag, such addition taking effect on the fourth day of July then next succeeding such admission.

Standard, BATTLE OF THE, a battle in which David I of Scotland, who had espoused the cause of Maud against Stephen, was signally defeated by the English under the Bishop of Durham. It was fought in the neighborhood of Northallerton, in Yorkshire, on the 22d of August, 1138, and it got its name from the fact that the English forces were gathered round a tall cross mounted on a car, and surrounded by the banners of St. Cuthbert, St. Wilfred, and St. John of Beverley.

Standard of Money, in coinage, the proportion of weight of fine metal and alloy established by authority. The standard for gold and silver coins of the United States is 900 parts pure metal and 100 parts alloy. The standard of gold coins in Britain is 22 carats fine gold and 2 of alloy. The standard of silver coins is 11 ounces 2 dwts. of pure silver and 18 dwts. of alloy.

Standard Time, a system of time-reckoning, chiefly for the convenience of railroads in the United States. The United States, beginning at its extreme eastern limit and extending to the Pacific coast, is divided into four time-sections, Eastern, Central, Mountain and Pacific. The Eastern section, the time of which is that of the 75th meridian, lies between the Atlantic Ocean and an irregular line drawn from Detroit, Mich., to Charleston, S. C. The Central, the time of which is that of the 90th meridian, includes all between the last-named line and an irregular line from Bismarck, N. D., to the mouth of the Rio Grande. The Mountain, the time of which is that of the 105th meridian,

includes all between the last-named line and the w. boundary of Montana, Idaho, Utah, and Arizona. The Pacific, the time of which is that of the 120th meridian, includes all between the last-named line and the Pacific coast. The difference in time between adjoining sections is one hour.

Standing Stones are large rough, erect monoliths found not only in all parts of Europe, but also in some countries of the East and even in the New World, and nowhere more common than in Great Britain. They sometimes occur singly, sometimes in groups. The principal purposes of the single standing stones appear to have been to serve as boundary-marks, as memorials of battle, and as sepulchral monuments. A number of these single standing stones are perforated, such as the stone which stands in the center of a circle at Applecross, in the west of Ross-shire; the Clach-charra, or stone of vengeance, at Onich, near Ballachulish, Argyleshire; and another called the Stone of Odin, near the circle of Stennis, in the island of Pomona, in Orkney. The groups of standing stones that exist in various parts of Great Britain, as well as in some parts of the Continent, were thought by antiquaries to be connected with the Druidical worship of the Celts, but, for want of sufficient evidence, this theory has been abandoned. The best preserved of these groups are those of Avebury and Stonehenge in Wiltshire; that of Carnac in Brittany; that of Callernish, near Loch Roag, in Lewis, in the Hebrides; and the circles of Brogar and Stennis in Pomona in Orkney. See *Avebury*, *Carnac*, *Stenness*, and *Stonehenge;* also *Cromleck* and *Dolmen*.

Standish (stan'dish), Miles, born in Lancashire about 1584; died in 1656. He claimed to be the descendant of the Standish family of Duxbury Hall, served as a captain in the Netherlands, and joined the Puritans when they sailed for New England in the *Mayflower* (1620). He took an active part in the early struggles of the colony with the Indians. An interesting tradition regarding his courtship is celebrated in a well-known poem by Longfellow.

Stanfield (stan'fēld), William Clarkson, marine painter, born of Irish parents at Sunderland, England, in 1794; died in 1867. He began life as a sailor; occupied his spare time in sketching; received an engagement to paint scenery for the Old Royalty Theater, London; became scene-painter at Drury Lane in 1826; was elected a member of the Society of British Artists, and abandoned scene-painting in 1830. Among his pictures may be mentioned: *Mount St. Michael* (1831); *The Battle of Trafalgar* (1836); *The Body of Nelson Towed into Gibraltar* (1853), and *The Abandoned* (1856). A number of his works were engraved under the title of Stanfield's Coast Scenery.

Stanford (stan'furd), Charles Villiers, an English composer, born at Dublin, in 1852; became organist of Trinity College, Cambridge; conductor of the Cambridge Musical Society; and, in 1887, professor of music in Cambridge. His operas include: *The Veiled Prophet of Khorassan* (1881); *Savonarola*, and the *Canterbury Pilgrims* (1884). He has also written an oratorio, *The Three Holy Children* (1885); an *Irish Symphony;* a choral ode, *The Revenge* (1886); and a setting of Walt Whitman's poem on the *Death of Abraham Lincoln*.

Stanford, Leland, the founder of Leland Stanford, Jr., University, California, was born in Albany county, New York, in 1824. After studying law and practicing in New York State he removed to Wisconsin, then to California, where he took an interest in mining and as a commercial speculator, and realized a large fortune. In 1860 he was elected governor of California, and in 1863 president of the Central Pacific railroad. He was interested, in various capacities, in almost every railroad and steamboat corporation on the Pacific slope. He was elected to the United States senate in 1884, and reëlected in 1890. A liberal contributor to charities, his greatest gift has been the Stanford university, established as a memorial to his deceased son, his endowment amounting to about $20,000,000, including landed property worth $6,000,000. He died June 20, 1893. His wife, Jane L. Stanford, in 1901 added enormously to the endowment, her gifts swelling it to more than $45,000,000. See *California*.

Stanhope (stan'hōp), the name of a noble English family. James, first Earl Stanhope, was born in 1673 and died in 1721. He entered the army, was appointed commander-in-chief of the British forces in Spain, and in 1708 took Port Mahon.—Charles, the third earl, born in 1753, was celebrated chiefly as an inventor, a patron of science, and the avowed advocate of republicanism.—Philip Henry, fifth earl

was born in 1805; and died in 1875. He was best known, under his title of Lord Mahon, as the author of a *History of the Succession War in Spain* (1832), and other works.— LADY HESTER LUCY, daughter of the third Earl Stanhope, was born in London in 1776, and died in Syria in 1839. In 1810 she left England, visited various places in the East, and finally settled in Syria. She adopted the dress of an Arab chief, and by her kindness and masculine energy exercised great influence over the Bedouins. Her *Memoirs* were published in 1845-46.

Stanhope, PHILIP DORMER. See *Chesterfield.*

Stanislau (stän'is-lou; Polish *Stanislawów*), a town of Galicia, under Polish administration, 74 miles S. E. of Lemberg. Formerly included in Austrian territory, it was the scene of several battles in the European war. Pop. 33,328.

Stanislaus Augustus, STANISLAUS II (stan'is-laws), the last king of Poland, son of Count Stanislaus Poniatowski, was born at Wolczyn, Lithuania, in 1732; died in 1798. Sent by Augustus III of Poland on a mission to St. Petersburg, he became a favorite with the grandprincess (afterwards the Empress Catherine), by whose influence he was crowned king of Poland at Warsaw in 1764. The nobility, however, were discontented with this interference on the part of Russia, and forcibly compelled the king to abdicate (1771). He protested against the various partitions of Poland, formally resigned his sovereignty in 1795, and finally died in St. Petersburg as a pensioner of the Empress Catherine.

Stanislaus Leszczynski (lesh-chin'ski), STANISLAUS I, King of Poland, afterwards Duke of Lorraine and Bar, was born at Lemberg in 1677; died in 1766. His father was grand treasurer to the Polish crown, and he himself was voivode of Posen, when he was recommended to the Warsaw assembly by Charles XII of Sweden as a candidate for the vacant throne of Poland. He was accordingly elected and crowned (1705), but after the disastrous battle of Poltava (1709), when his patron Charles XII was defeated, he had to flee from Poland. He found refuge in France ultimately, where his daughter Maria became wife to Louis XV. Assisted by the French king he sought to establish his claim to the throne of Poland in 1733, but, opposed by the united powers of Saxony and Russia, he had again to retire into France, where he held possession of the duchies of Lorraine and Bar until his death. His writings were published under the title of *Œuvres du Philosophe Bienfaisant* (1765).

Stanley (stan'li), ARTHUR PENRHYN, son of Edward Stanley, rector of Alderley, was born at Alderley, Cheshire, in 1815; died in 1881. He was educated at Rugby and Balliol College, Oxford; obtained a fellowship, and remained a tutor for twelve years; was appointed in 1845 preacher to Oxford University; presented to the canonry of Canterbury in 1851, and appointed dean of Westminster in 1863. He was a leader of the Broad Church party, and the author of numerous works, of which may be mentioned: *Life of Arnold* (1844); *Commentary on the Epistles to the Corinthians* (1854); *Memorials of Canterbury Cathedral* (1855); *Sinai and Palestine* (1856); *Essays on Church and State* (1870), and *Leetures on the History of the Chureh of Scotland* (1872).

Stanley, HENRY MORTON, born near Denbigh, Wales, in 1840, was placed in the poorhouse of St. Asaph at the age of three; subsequently, in 1855, shipped as cabin-boy to New Orleans, and was there adopted by a merchant, whose name he assumed, discarding his own name of John Rowlands. His adoptive father having died

Henry Morton Stanley (Jan., 1886).

intestate, Stanley enlisted in the Confederate army, where he was taken prisoner, but after his discharge he volunteered into the navy, and became an ensign on the iron-clad *Ticonderoga.* At the close of the war he went to Turkey as a newspaper correspondent, and as war correspondent for the *New York Herald* he joined the Abyssinian expedition of 1867-68. He afterwards traveled in Spain, and it was while there

in 1869 that he was asked by the proprietor of the *New York Herald* 'to go and find Livingstone.' After visiting the Crimea, Palestine, Persia, and India, he reached Zanzibar in the early part of 1871, and from thence he proceeded across Africa in search of Livingstone. He met and relieved this famous traveler at Lake Tanganyika in November of the same year, and returned to England. He then acted as the *Herald's* correspondent during the Ashantee war (1873-74). As correspondent of the *Daily Telegraph* and the *New York Herald* he in 1874 undertook an expedition into Africa, where he explored the equatorial lake region and for the first time traced the Congo River from the interior to its mouth (1877), crossing central Africa from sea to sea. For the purpose of developing this vast region he returned in 1879 under the auspices of the International African Association, founded by the King of the Belgians, planted stations and established steam navigation, the territory being named in 1885 the Congo Free State. In 1887 he organized an expedition for the relief of Emin Pasha, who after the Mahdist rising in the Soudan had become cooped up with his Egyptian followers in the Equatorial Province of Egypt at Wadelai, north of Lake Albert Nyanza. This time he entered Africa on the west by way of the Congo; and after a series of extraordinary marches through a forest region, accompanied with great hardships, he met Emin Pasha in the neighborhood of the Albert Nyanza. After a return journey to bring up the rear-column, which he had left in charge of Major Barttelot on the Aruwimi, Stanley finally, in May, 1889, set out from the Albert Nyanza, and brought the pasha and his followers to Bagamoyo in January, 1890. On his return to Britain he undertook a lecturing tour, and was overwhelmed with honors in all parts of the country. He is the author of *How I Found Livingstone* (1872); *Through the Dark Continent* (1878); *The Congo, and the Founding of its Free State* (1885), and *In Darkest Africa* (1890). He died May 10, 1904.

Stanley Falls, STANLEY POOL. See *Congo Free State.*

Stan'nard, MRS. ARTHUR, an English novelist, born at York in 1856. She used the *nom-de-plume* of JOHN STRANGE WINTER, her works including *Bootle's Baby, Only Human, Everybody's Favorite,* and numerous others. She died December 14, 1911.

Stanovoi (stä-nō-voi'), or YABLONOI, a mountain-chain in the northeast of Asia, which forms the boundary between Siberia and Manchuria, skirts the sea of Okhotsk, and is continued, though with gradually diminishing height, to the shores of Behring's Strait. The whole length of the chain has been estimated at 3000 miles. The eastern part is often distinctively called Yablonoi. This mountain range gives rise to the rivers Amur and Anadir on its south and east side, and to the Yenisei, Lena, Indighirka, and Kolyma on the north and west side.

Stanton (stan'tun), EDWIN M'MASTERS, an American statesman, was born at Steubenville, Ohio, in 1814; died at Washington in 1869. He acted for three years as clerk in a book shop; attended Kenyon College in 1831-33; subsequently studied law, and was called to the bar in 1836. He acquired a large practice in the Supreme Court at Washington, and after Buchanan was elected president he entered the cabinet (1860). Shortly after the outbreak of hostilities between the North and the South President Lincoln appointed him head of the war department (Jan., 1862), and his acceptance of the office marked the beginning of a vigorous military policy. He selected General Grant for promotion after the victory at Fort Donelson; and it was he who, in 1863, placed Grant in supreme command of the three armies operating in the southwest. In all the important movements of the war Stanton was consulted by the president. After the assassination of Lincoln he had some controversy with his successor, Andrew Johnson, who demanded his resignation. This he refused, and was upheld by the senate. In 1869 he was appointed justice of the Supreme Court, but he died a few days afterwards.

Stanza (stan'za), in poetry, a number of lines or verses connected with each other, and properly ending in a full point or pause. A stanza presents in meter, rhymes, and the number of its lines a combination which repeats itself several times in the course of the same poem.

Stanton, ELIZABETH CADY, woman's rights advocate, was born at Johnstown, New York, in 1815; died October 26, 1902. She was an ardent student of mathematics, Latin and Greek, but the fact that no college admitted women excited her indignation and led her into active advocacy of reform. She married the popular anti-slavery lecturer, Henry B. Stanton, in

1839, and from that time forward was one of the most earnest advocates of 'Woman's Rights.' The first Woman's Rights convention was held in 1848, chiefly through her influence, and she was president of the National Woman's Suffrage Association 1865-93 and one of the editors of *The Revolution.* Her eightieth birthday was celebrated at New York in 1895 by an assemblage of 3000 delegates from women's societies.

Stapelia (sta-pē'li-a), an extensive and curious genus of plants, nat. order Asclepiadaceæ, or milkweeds. Most of the species are natives of the Cape of Good Hope. They are succulent plants, without leaves, frequently covered over with dark tubercles, giving them a very grotesque appearance. In most instances the flowers give off a a very unpleasant odor, like that of

Stapelia variegata.

rotten flesh, insomuch that the name of carrion-flower has been given to some of these plants. They are, nevertheless, cultivated on account of their singular and beautiful flowers.

Staphyle'a. See *Bladder-nut.*

Staphylinus (sta-fil-ī'nus), a genus of coleopterous insects, with short wing-sheaths, the type of the family Staphylinidæ; commonly called *rove-beetles.*

Staphyloma (sta-fil-ō'ma), a name given to different tumors of the anterior surface of the globe of the eye. Called also *staphylosis.*

Staple (stā'pl), according to old usage, a settled mart or market-town where certain commod'ties were chiefly taken for sale. In England, formerly, the king's staple was established in certain ports or towns, and certain goods, such as wools, skins and leather, could not be exported without being first brought to these ports to be rated and charged with the duty payable to the king or public treasury.

Star, Polar. See *Pole-star.* There is a Swedish order of knighthood so named. It is bestowed specially on those who have distinguished themselves in a civil capacity. Its motto is, 'Nescit occasum.'

Staraia-Russa (stä'rå-yå rös'så), a town of Russia, in the government and 40 miles south of Novgorod, on the Polista. It has an imperial palace, a military colony, and important salt-works. Pop. 15,234.

Star-anise. See *Anise.*

Star-apple, the popular name of several species of plants of the genus *Chrysophyllum,* nat. order Sapotaceæ, whose fruit is esculent. *Chrysophyllum Cainīto* is the most important species. It is a native of the West Indies. The fruit resembles a large apple, which in the inside is divided into ten cells, each containing a black seed, surrounded by a gelatinous pulp, which is very palatable; known also as custard-apple.

Star-apple (*Chrysophyllum Cainīto*).

Starboard, the right side of a ship when the eye is directed towards the head, stem, or prow. See *Port.*

Starch ($C_6H_{10}O_5$ or $C_{12}H_{20}O_{10}$), a proximate principle of plants, universally diffused in the vegetable kingdom, and of very great importance. It occurs in seeds, as in those of wheat and other cereal grains, and also in leguminous plants; in roots, as in the tubers of the potato; in the stem and pith of many plants, as in the sago plant; in some barks, as in that of cinnamon; and in pulpy fruits, such as the apple. Finally, it is contained in the expressed juice of most vegetables, such as the carrot, in a state of suspension, being deposited on standing. The starch of commerce is chiefly extracted from wheat flour and potatoes. When pure, starch is a snow-white powder of a glistening appearance, which makes a crackling noise when pressed with the finger. It is composed of transparent rounded grains, the size of which varies in different plants, those of the potato being among the largest, and those of wheat and rice the smallest. It is insoluble in cold

water, alcohol, and ether; but when heated with water it is converted into a kind of solution, which, on cooling, forms a stiff semi-opaque jelly. If dried up this yields a translucent mass, which softens and swells into a jelly with water. It is employed for stiffening linen and other cloth. When roasted at a moderate heat in an oven it is converted into a species of gum employed by calico-printers; potato starch answers best for this purpose. (See *Dextrine.*) Starch is convertible into sugar by boiling with dilute sulphuric acid. Starch forms the greatest portion of all farinaceous substances, particularly of wheat flour, and it is the chief ingredient of bread.

Star-chamber, formerly an English court of civil and criminal jurisdiction at Westminster. It consisted originally of a committee of the privy-council, and was remodeled during the reign of Henry VII, when it consisted of four high officers of state, with power to add to their number a bishop and a temporal lord of the council, and two justices of the courts of Westminster. It had jurisdiction of forgery, perjury, riots, maintenance, fraud, libel, and conspiracy, and could inflict any punishment short of death. Its process was summary and often iniquitous (especially in the reigns of James I and Charles I) and the punishment it inflicted often arbitrary and cruel. This court was abolished (1640) by statute 16 Charles I.

Starch-hyacinth, a plant, the *Muscāri racemōsum*, of the same nat. order with the hyacinth, and named from the smell of the flower. Called also *Musk-hyacinth* and *Grape-hyacinth.*

Star-fishes, a term in its widest application embracing all the echinoderms comprised in the orders Ophiuroidea and Asteroidea, but more commonly restricted to the members of the latter order, of which the common genus *Asterias* may be taken as the type. The star-fishes proper are covered with a tough leathery skin beset with prickles, and have the form of a star, with five or more rays radiating from a central disk. In the middle of the under surface of the disk is situated the mouth, opening into a digestive system which sends prolongations into each ray. If the prickly skin be removed it will be seen to be supported by a series of plates beautifully jointed together. On the under surface of each ray the plates exhibit a series of perforations, through which, in the living state, the ambulacra or tubular feet can be protruded so as to effect locomotion. Star-fishes are found in almost all tropical, European and

Star-fish (*Uraster rubens*).

American seas, and some species are found as far north as Greenland.

Stargard (stär'gärt), a town in the prov. of Pomerania, Prussia, situated on the navigable Ihna, 21 miles E. S. E. of Stettin. It has manufactures of leather, machinery, hats, soap, spirits, etc. Pop. 26,908.— There is another Stargard in West Prussia, 28 miles south by east of Danzig. Pop. 9682.

Star-gazer, a species of acanthopterygious fishes of the perch family, the *Uranoscŏpus scaber*, inhabiting the Mediterranean, and so-called because the eyes are situated on the top of the head and directed towards the heavens. The name is also applied to fishes allied to the carp, of which *Anableps tetrophthalmus* is the best-known type. It is found in the rivers of Guiana.

Stark, John, soldier, was born in New Hampshire, in 1728. He distinguished himself in the French and Indian war, and afterwards in the Revolution at Bunker Hill, Trenton and Princeton. But his great exploit was his signal victory at Bennington over a portion of Burgoyne's army. For this he was made brigadier-general and received thanks from Congress. He afterwards served under General Gates, in Rhode Island, in 1779, and in New Jersey in 1780, and in 1781 was put in com-

mand of the Northern department, with headquarters at Saratoga. He died in 1822.

Starling (stär'ling), called also STARE, a bird belonging to the conirostral section of the order Passeres, genus *Sturnus* and family Sturnidæ, a family of birds widely distributed throughout the world, and allied to the crows. The common starling (*Sturnus vulgāris*) is found in almost all parts of Europe. It is between 8 and 9 inches in length; the color is blackish, with blue, purplish, or cupreous reflections, and each feather is marked at the extremity with a whitish triangular speck, giving the bird a speckled appearance. Starlings live mostly upon insects, build in old walls and hollow trees, and the eggs, usually five, are of a pale bluish tint. These birds are often kept in cages, and may be taught to whistle some tunes, and even to pronounce words and sentences. Allied species are the *Sturnus unicolor*, found in Sardinia, the rose-colored pastor of Asia and Africa, and the red-winged starling (*Agelāius phœniceus*) which occurs in America.

Starodoub (stä-rà-döp'), a town of Russia, in the government of Chernigov, 97 miles northeast of Chernigov. It has manufactures of leather and copper-ware and trade in hemp, tallow, corn, brandy, honey, and wax. Pop. 12,451.

Star of Bethlehem (*Ornithogălum umbellātum;* nat. order Liliaceæ), a bulbous-rooted plant with white star-like flowers. It is common in many parts of Europe, and is naturalized in parts of the United States.

Star of India. See *Knighthood.*

Starost (star'ost), in Poland, the name given to the noblemen who were reckoned among the dignitaries of the land, and who received a castle or landed estate from the crown domains. Some of the starosts had civil and criminal jurisdiction over a certain district (*grod*), others merely enjoyed the revenues of the starosty.

Star-reed, a Peruvian plant of the genus *Aristolochia*, the *A. fragrantissima*, the root of which is highly esteemed in Peru as a remedy against dysenteries, malignant inflammatory fevers, colds, rheumatic pains, etc.

Stars, the self-shining bodies seen in the heavens at night, situated at immense distances from us, and believed to be constituted like our sun and to resemble it in being the center of systems similar to our own. To superficial observation stars are distinguished from planets by remaining apparently immovable with respect to one another, and hence they were called *fixed stars*, although their fixity has been disproved in numerous cases, and is no longer believed in regard to any. In order to distinguish the stars one from another the ancients divided the heavens into different spaces containing groups of stars called constellations. (See *Constellation.*) The stars are divided, according to their brightness, into stars of the first, second, third, etc., magnitudes; but no magnitude, in the proper sense of the word, has yet been observed in any star. All the stars beyond the sixth or seventh magnitude are called *telescopic stars*, as they cannot be seen without the aid of the telescope; and these are continued by astronomers down to the sixteenth magnitude. As to the absolute size of the stars little is known; but the light given out by Sirius is estimated at 63½ times that of the sun. The colors of the stars vary considerably, white, red, yellow, green, and blue being noticed. The stars are very irregularly distributed over the celestial sphere. In some regions scarcely a star is to be seen, while in others they seem crowded together, this being especially the case in the Milky Way. In some cases a certain number of stars evidently belong to a system by themselves. Of the stars visible to the naked eye at any time the number probably does not exceed a few thousands, but in the telescope their number is so great as to defy all calculation. The distances of the stars from the earth are very great. The shortest distance yet found, that of *a* Centauri, a double star in the southern hemisphere, has been calculated at 26 trillions of miles, so that light takes 3.6 years to travel from it to our earth. Many stars have been observed whose light appears to undergo a regular periodic increase and diminution of brightness, amounting, in some instances, to a complete extinction and revival. These are called *variable* and *periodic stars.* It is found that some stars, formerly distinguished by their splendor, have entirely disappeared. Such stars are called *temporary stars.* Many of the stars that usually appear single are found, when observed with telescopes of high magnifying power, to be really composed of two, and some of them three or more stars in close juxtaposition. These are termed *double* and *multiple stars.* By means of spectrum analysis some valuable results regarding the stars have

latterly been obtained; in particular, many of the elements familiar to us have been detected in them, and the spectroscope has also proved that the star Arcturus is approaching us and Sirius is receding. See *Astronomy*, *Nebulæ*, and *Meteor*.

Star-shoot, STAR-SHOT, a gelatinous substance often found in wet meadows, and formerly supposed to be the extinguished residuum of a shooting-star. It is, however, of vegetable origin, being the common nostoc. See *Nostoc*.

Star-stone, a rare variety of sapphire. When cut, and viewed in a direction perpendicular to the axis, it presents a peculiar reflection of light in the form of a star.

Star-thistle, an European plant (*Centaurea Calcitrapa*) which grows in gravelly, sandy, and waste places in the middle and south of England, especially near the sea, and is remarkable for its long spreading spiny bracts The *yellow star-thistle* (*Centaurea solstitialis*) is occasionallly seen in fields and waste places. It is called *St. Barnaby's thistle*. The *C. Americana*, native in Arkansas and Louisiana, has very showy, pale-purple heads.

Star-point, a headland near the southern extremity of Devonshire, about 9 miles S. S. W. of Dartmouth, at the entrance to the Start Bay, and having a lighthouse with a revolving light 204 feet above sea-level.

Starvation (stär-vā'shun), or INANITION, is the physical effect produced by the total want of food and water. The symptoms of starvation in man are: an increasing loss of weight, severe pain in the stomach, loss of strength, sleeplessness, great thirst, in some cases stupor, and in other cases nervous excitement with convulsions. Meanwhile the face assumes a haggard expression, the skin is said to become covered with a brown secretion, and at last death occurs in about eight days. With a good supply of water, however, life may be prolonged, in the absence of solid food, for a period of two or three weeks, and a moist atmosphere would even seem to favor the prolongation of life. Certain diseases, such as stricture or cancer of the opening of the stomach, etc., may occasion starvation, and it is to be noted that gradual starvation may result from the continued low percentage of nutritive matter in the daily diet. See *Fasting*.

Starwort (stär'wurt), the popular name of several plants, some of them belonging to the genus *Stellaria*, or that of chickweed. *Sea starwort* is an annual herbaceous plant of the genus *Aster*, the *A. Tripolium*. It has pale blue flowers with a yellow disk, and grows in salt marshes.

Stassfurt (stäs'fört), a town of Prussia, province of Saxony, district of Magdeburg, on the Bode, famous for its great deposits of rock-salt and potassium salts (carnallite, kainite, kieserite), etc., the working of which is the most important industry, the products including potash, epsom-salts, glauber-salts, sulphate of potash, chloride of magnesium, bromine, etc. Pop. 18,310.

Staten Island, an island of New York, constituting nearly the whole of Richmond county, and separated from Long Island by the Narrows which form the entrance to New York harbor, and from New Jersey by Staten Island Sound, about ¼ mile broad. Its length is 14 miles, and its greatest breadth 8 miles. It now forms a portion of New York City and is given the name of the Borough of Richmond.

Staten Island, an island off the southeast coast of Tierra-del-Fuego, separated from the mainland by the Strait of Le Maire.

States (stāts), in politics, divisions of nations associated for public ends; as, the States of the American Union, States of Brazil, Mexico, etc. See, also, *Estates of the Realm*.

States-general (French *États Généraux*), thus called to distinguish them from the provincial States (*états provinciaux*), the name given in France till 1789 to the assemblies of the deputies of the three orders of the nation, the clergy, the nobility, and the third estate (*tiers état*). This assembly had little legislative power, its chief function being to register the king's decrees in matters of taxation. States-general were first convoked in 1302 by Philip the Fair; they were convened in 1614 by Louis XIII; and again, for the last time, they met before the Revolution at the summons of Louis XVI. In the latter instance the third estate assumed the title of National Assembly, and the States-general ceased to exist. The name is at the present day applied to the legislative assembly of the Netherlands.

Statesville, county seat of Iredell Co., North Carolina, 44 miles N. of Charlotte. It has water power and textile mills, wood-working plants, glass factory, etc. Pop. 7895.

Statice (stat'i-sē), a genus of herbaceous or subshrubby plants, nat. order Plumbaginaceæ. The *S. caroliniana*, a very powerful astringent, is

used in North America for all the purposes of kino and catechu.

Statics (stat'iks), that branch of dynamics which treats of the properties and relations of forces in equilibrium — equilibrium meaning that the forces are in perfect balance, so that the body upon which they act is in a state of rest. According to the classification still employed by many writers on the subject the word *statics* is used in opposition to *dynamics*, the former being the science of equilibrium or rest, and the latter of motion, both together constituting *mechanics*. But among more recent authors *mechanics* is used to express not the theory of force and motion, but rather its application to the arts. The word *dynamics* is employed as expressing the science which treats of the laws of force or power, thus corresponding closely to the old use of the term *mechanics;* and this science is divided into *statics* and *kinetics*, the first being the science which treats of forces considered as producing rest, and the second as treating of forces considered as producing motion. See *Dynamics*.

Stations (stā'shuns), a name variously used in the Roman Catholic Church, but especially applied to the places at which ecclesiastical processions pause for the performance of an act of devotion, and to those representations of the successive stages of our Lord's passion which are often placed round the naves of large churches, and by the side of the way leading to sacred edifices, and which are visited in rotation.

Statistics (sta-tis'tiks), a collection of facts relating to a part or the whole of a country or people, or of facts relating to classes of individuals or interests in different countries; especially, those facts which illustrate the physical, social, moral, intellectual, political, industrial, and economical condition or changes of condition, and which admit of numerical statement and of arrangement in tables. The collection of statistics may have the object merely of ascertaining numbers, as is often the case with statistics collected for purely administrative purposes; or it may be undertaken with the view of learning what happens on an average of a great number of cases, as is the case of insurance statistics; or its object may be to detect the causes of phenomena that appear in the consideration of a great number of individual cases — such phenomena, for example, as the decline of a certain trade, the prevalence of a certain disease, etc. In all civilized countries the collection of statistics forms an important part of the administrative duties of government, and in some cases it is intrusted to a special bureau. The first country to possess an institution of this nature was Belgium, its organizer being the eminent statistician Lambert Quetelet. A congress of statisticians was held at Brussels in 1853, and this has been repeated at intervals. In Berlin a seminary was established in 1862 for the purpose of training statisticians, and in 1874 a professorship of statistics was established in the university there. Several nations now devote much time and labor to the collection and tabulation of their statistics, and this is especially the case in the United States, which is remarkable for the fulness of its census inquiries and the variety and value of the statistics gathered.

Statius, Publius Papinius, a Roman epic poet, born at Naples in the reign of the Emperor Nero, about 40 A. D.; died about 96 A. D. His principal productions are two epic poems —the *Thebais*, in twelve books, on the war of the seven Greek princes against Thebes; and the *Achilleis*, in two books, on the achievements of Achilles.

Statue. See *Sculpture.*

Statue of Liberty. See *Liberty, Statue of.*

Statute (stat'ūt), a law proceeding from the government of a State; the written will of the legislature solemnly expressed according to the forms necessary to constitute it the law of the State. A statue which contravenes a provision of the constitution of a State by whose legislature it was enacted, or of the United States Constitution, is void. Statutes are either public or private (in the latter case affecting an individual or a company); but the term is usually restricted to public acts of a general and permanent character. Statutes are said to be *declaratory* of the law as it stood before their passing; *remedial*, to correct defects in the common law; and *penal*, imposing prohibitions, and penalties. Statutes contained in the revised or compiled statutes of a state or of the United States may be amended or supplemented by subsequent acts. The term *statute* is commonly applied to the acts of a legislative body. In monarchies not having representative bodies, the laws of the sovereign are called *edicts, decrees*, etc.

Staubbach (stoub'bâh), Fall of, a water-fall, whose height is about 900 feet, situated in Switzerland, canton of Berne, nearly 6 miles southeast of Interlaken, and about a mile from the village of Lauterbrunnen. The stream is so small that the water is con-

verted into spray long before it reaches the bottom.

Staunton (stạn'tun), a city, county seat of Augusta Co., Virginia, 136 miles N. W. of Richmond. It has State institutions for the deaf and blind, the Staunton Military Academy, and other educational institutions. Overalls, flour, agricultural implements, organs, pennants, etc., are made. Here President Woodrow Wilson was born. Pop. (1910) 10,604; (1920) 10,623.

Staunton, a city of Macoupin Co., Illinois, 38 miles N. E. of St. Louis, Mo. It is in a coal, oil and gas section. Pop. (1920) 6027.

Staunton, HOWARD, born in 1810; died in 1874. He was educated at Oxford, and settled in London as editor of the *Chess Players' Chronicle.* In this game he defeated M. St. Amant (1843), the champion of Europe, and he subsequently published various treatises on chess, as the *Handbook* (1847), the *Companion* (1849), *Chess Tournament* (1852), and *Chess Praxis* (1860). He was an eminent Shakespearean scholar, and published an edition of the *Plays and Poems* (three vols. 1857-60), a facsimile of the (1623) first folio, and *Memorials of Shakespeare* (1864). He was also the author of the *Great Schools of England* (1865).

Stavanger (stȧ'vȧng-ėr), a seaport of Norway, on an arm of the Bukkefiord, 105 miles northwest of Christiansand. It is one of the oldest towns in Norway, and has a remarkable ancient Gothic cathedral, one of the finest Gothic monuments in the country. It has some manufactures, a good harbor, and an active trade in connection with fishing. Pop. 30,541.

Stavoren (stȧ'vō-ren), a village of Holland, in the province of Friesland, 29 miles southwest from Leeuwarden, at the entrance to the Zuyder-Zee. It was once an important seaport, but it has now become an insignificant place, the harbor having been sanded up. Pop. 900.

Stavropol (stäv'rō-pōl), a government of Russia in the Caucasus, and bordering on the Caspian Sea; area, 26,500 sq. miles. This territory, which is low, flat, and infertile, is watered by the Kuban, Terek, and Kuma, and is subject to sudden inundations. The inhabitants are chiefly Russians, Cossacks, and nomad Turkomans. Pop. 1,023,700.— STAVROPOL, the capital of this district, is situated on a plateau, where it is strongly fortified, and has a large trade in horses, cattle, sheep, etc. Pop. 46,965.

Stawell (stạ'el), a town of Australia in Victoria, 176 miles northwest of Melbourne. The public buildings include a town-hall, courthouse, post and telegraph office, hospital, handsome churches, mechanics' institute, and theater. It is the center of the Pleasant Creek gold-field, and is best known on account of its rich quartz reefs. Pop. about 5500.

Stay (stā), in ships, a large, strong rope, extending from the upper end of a mast down to another mast, or to some part of the vessel, with the object of lending support to the mast to whose top it is attached. Those leading forward are called fore-and-aft stays, and those leading down to the vessel's sides and pulling a little backwards are called back stays. A sail extended on a stay is a stay sail. In large vessels there are a number of these of a triangular shape. *To stay* is to tack or bring the ship's head up to the wind for going about; *to miss stays* is to fail in the attempt to go about. *In stays* or *hove in stays* is the situation of a vessel when she is in the act of going about.

Stays. See *Corset.*

St. Bernard, a village of Hamilton Co., Ohio, 7 miles from Cincinnati. It manufactures fertilizers and cigars. Pop. 5002.

St. Clair, a borough of Allegheny Co., Pennsylvania. Pop. 5640.

St. Clair, a borough of Schuylkill Co., Pennsylvania, 3 miles N. of Pottsville. Miners' supplies are manufactured. Pop. 6455.

Stealing. See *Larceny.*

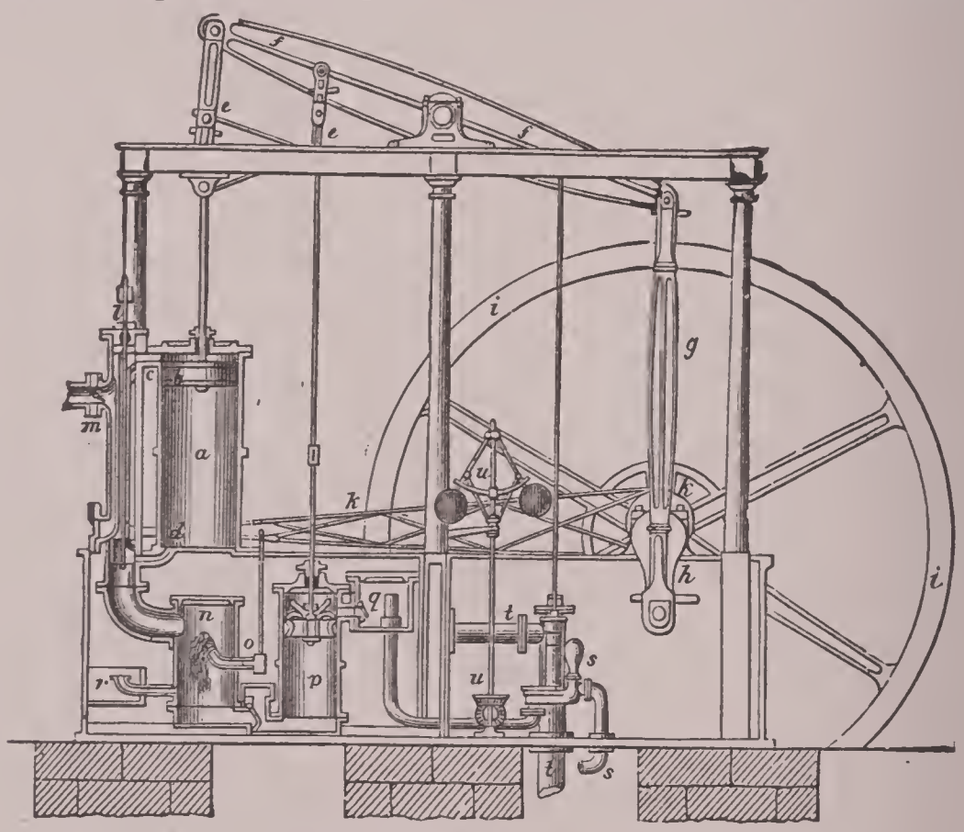
Stead (sted), WILLIAM THOMAS, an English journalist; born at Embleton in 1849. He was editor of the *Review of Reviews,* which he founded in January, 1890. In 1893 he established *Borderland,* a spiritualistic periodical. His writings were of a radical character, such as *If Christ Came to Chicago.* He went down with the 'Titanic' in 1912.

Steam (stēm), the vaporous substance into which water is converted under certain conditions of heat and pressure. It may be said, indeed, that water gives off vapor or steam at *every* temperature, but the term is technically applied to the elastic aeriform fluid generated by heating water to the boiling point. Steam, in its perfect state, is transparent, colorless, and invisible; but when it has been deprived of part of its heat by coming into contact with cold air it suddenly assumes a cloudy appear-

ance, and is condensed into water. When water, in an open vessel, is heated to the boiling point (212° F.) globules of steam are formed at the bottom and rise to the surface, where they pass off in vapor. In this case all the heat which enters into the water is solely employed in converting it into steam of the temperature of boiling water, while the continued and increased application of heat will only cause a more rapid formation of steam until the whole of the water evaporates. When water, however, is confined in a strong close vessel, both it and the steam which it produces may be brought to any temperature; and as steam at boiling point occupies 1642 times the space of the water from which it is generated, it follows that when thus confined it must exercise an enormous expansive force. Steam, as used in the steam-engine, holds water in suspension mechanically, and is called *saturated steam;* while the steam which receives additional heat apart from water is called *superheated steam*, and approximates to the condition of a perfect gas. When the temperature of saturated steam is considerably above 212° F., the steam formed under such conditions is termed *high-pressure steam*, while at 212° F. it is called *low-pressure steam*, and its pressure is equal to that of one atmosphere, or 14.7 lbs. on the square inch. Another element in the constitution of steam is its density, which is expressed by the weight of 1 cubic foot of the steam. This density is increased with an increase of the pressure under which the steam is generated, for the particles of steam become more closely packed together. Thus the density of steam produced at 212° has been found to be equal to .038 lb. or $\frac{5}{8}$ oz. per cubic foot from which it follows that the volume of 1 lb. of such steam is equal to 26.36 cubic feet. Like the pressure or expansive force of steam, the density is invariably the same for a given temperature. From the possession of the properties thus briefly stated, steam constitutes an invaluable agent for the production of mechanical force, as shown in the various uses of the steam-engine. It is also employed in distributing the heat used for warming buildings, in heating baths, evaporating solutions, brewing, drying, dyeing, and even for cookery.

Steam Engine, a mechanical contrivance, in which the force arising from the elasticity and expansive action of steam, or from its property of rapid condensation, or from the combination of these qualities, is made available as a source of motive power in the arts and manufactures, and in locomotion. The expansive power of steam was known to the ancients, and its earliest use in connection with a mechanical contrivance is noted by Hero of Alexandria (about 130 B.C.) in his Pneumatica. In this treatise Hero describes an æolipile or hollow spherical vessel turning on an axis, supplied with steam, and driven by the reaction from the escaping jets of steam, much in the same way as Barker's mill (which see) is driven by escaping water. This invention had no practical result, and it was not until the 17th century that the power of steam was again recognized by Giovanni Battista della Porta (1601), Solomon de Caus (1615), Giovanni Branca (1629), and the Marquis of Worcester (1663). Their various inventions were an adaptation of the principle that a mechanical power is obtained by the pressure of steam acting on the surface of water placed in a closed vessel. This principle was put to practical use by Captain Thomas Savery (1698) in a steam engine which he constructed for the purpose of raising water out of mines; and with the elevation of water by pressure he also combined the principle of obtaining a vacuum by condensation. This principle, however, was made more practically effective by Denis Papin (1690), who constructed a steam engine in which a piston was forced down through the vacuum made by condensation. This first conception of a piston working in a cylinder was further developed by Newcomen (1705) and his assistant, Cawley. In their engine the boiler and furnace were separated from the cylinder and piston, and its chief characteristic was an oscillating *beam* connected on one side with the piston and on the other side with a pump-rod in the mine. When a vacuum was made under the piston in the cylinder by the injection of a jet of water, causing condensation, the piston was driven down by the pressure of the atmosphere, and as that end of the beam was lowered, the other end attached to the pump-rod was raised with its load of water. Various improvements were made upon this atmospheric steam engine by Smeaton and others, but its greatest development was effected by James Watt (1769). His improvements consisted in condensing the steam, not in the cylinder, but in a separate condenser, thus preventing the waste occasioned previously by the chilling and heating of the cylinder. Besides this, he preserved the heat in the cylinder by surrounding it with a layer of hot steam inside of an external casing; and with the same object he employed steam, instead

of air, to press down the piston from above. Thus he obtained the *double-acting* engine, which is so named because both the up-stroke and the down-stroke are produced by means of steam. Further, he devised a crank motion which converted the alternating motion of the oscillating beam into a continuous rotatory motion; but as this invention was pirated he patented the 'sun-and-planet' wheel as a substitute for the crank, returning afterwards to the crank. To these improvements he subsequently added a fly-wheel, in order to equalize the motion so as to drive the crank past the dead-points; is the manner in which steam is now used expansively. It was Jonathan Hornblower (1781) who first adopted the principle of expanding steam in two cylinders of different sizes. This form of *compound engine*, as it was called, was employed by Woolf (1814) in the Cornish mines, while it was improved by M'Naught (1845), and adapted by Elder (1854) to the use of marine engines. In the compound engine the steam receives the greater part of its expansion in a second cylinder of much larger diameter than the first, and by this means greater steadiness of piston-stroke, economy of fuel,



Beam Condensing Steam Engine.

a, The steam-cylinder; *b*, the piston; *c*, the upper steam-port or passage; *d*, the lower steam-port; *e e*, the parallel motion; *f f*, the beam; *g*, the connecting-rod; *h*, the crank; *i i*, the fly-wheel; *k k*, the eccentric and its rod for working the steam-valve; *l*, the steam-valve and valve-casing; *m*, the throttle-valve; *n*, the condenser; *o*, the injection-cock; *p*, the air-pump; *q*, the hot-well; *r*, the snifting-valve for creating a vacuum in the condenser previous to starting the engine; *s*, the feed-pump for supplying the boilers; *t*, the cold-water pump for supplying the condenser cistern; *u*, the governor.

a governor, whose purpose was to regulate the quantity of steam passing into the cylinder; an indicator, to measure the pressure upon the piston; and a slide-valve, moved automatically by an eccentric, the object of which was to regulate the action of the steam in the cylinder. The steam engine, as thus developed by Watt, was in nearly all essential points the same as the present-day engine. Probably the only improvement of primary importance which has been made in the steam engine since the time of Watt and increased driving power have been obtained. The use of expanded steam has been especially notable in the marine engine, where it is now expanded successively in three or even four cylinders.

The accompanying illustration represents a sectional elevation of a *beam condensing steam engine*, and shows the principles embodied in Watt's steam engine. The pipe conveying the steam from the boiler opens into the part marked *l*, which incloses a movable valve by means of which the steam may be alternately ad-

mitted into the cylinder *a* by the upper port *c* and lower *d;* between these points the piston *b* works steam-tight. The valve *l* is so contrived that while it allows steam to pass into the cylinder through one of the ports, it shall at the same time open a communication between the opposite side of the piston and the condenser *n*, which is a hollow vessel kept constantly immersed in cold water, a portion of which is admitted into it by the injection-cock *o;* consequently, the steam thus admitted is instantly deprived of its heat, and reconverted into its original form of water, thereby forming a vacuum. Thus it will be seen that, on the communication being opened up between the boiler and either side of the piston, the latter will ascend or descend in the cylinder unimpeded by the resistance of the atmosphere against the other side, and with a force proportional to the pressure of the steam; and as the motions of the steam-valve *l* are regulated by the engine itself, the above action is kept up continuously. The alternating rectilinear motion thus generated within the cylinder is transmitted, by means of a rod attached to the piston, to a strong beam *f f*, movable upon a central axis, a system of jointed rods *e e*, called the *parallel motion*, being interposed for the purpose of neutralizing the disturbing action which the circular path of the beam would otherwise exert upon the piston. The reciprocating motion of the beam is now, through the intervention of the connecting-rod *g* and crank *h*, converted into a circular or rotary motion, which is rendered continuous and uniform by the fly-wheel *i*, to the axis of which the machinery to be impelled is connected. The air-pump *p* for withdrawing the vapor and water from the condenser, the feed-pump *s* for supplying the boilers, and cold-water pump *t* for supplying the condenser cistern, are all worked by rods from the beam; and the governor *u*, for maintaining uniformity of motion, is driven by a band from the crank-shaft. The above description refers more immediately to that class of steam engines called *low-pressure* engines.

The various forms of the steam engine have received a varied form of classification. There are the general divisions into *condensing* and *non-condensing* engines, *compound* and *non-compound*, and *single*, *double*, or *direct-acting*. Again there is the classification connected with the position of the cylinder, as in the *horizontal*, *vertical*, and *inclined* cylinder engines. Another classification, and that which is adopted here, is to divide steam engines into the uses to which they are applied.

(1) *Stationary Engines* comprise all such engines as are permanently fixed for the purpose of driving the machinery in a factory, pumping water, etc. For a long time the favorite engine for these purposes was of the beam condensing type adopted and improved by Watt. But this has now, for the most part, been superseded by an engine the cylinders and connections of which are horizontal. In the most modern type the cylinder is fixed endwise to a base plate at one extremity, the crank-shaft has its bearings on the same base at the other extremity, and the piston-rod driven horizontally is guided by means of a crosshead, the ends of which slide between two parallel bars fixed on the frame. The Corliss engine is a well-known type of horizontal engine, its characteristic feature being the system of reciprocating valves by which the steam is passed to and from the cylinder. In some engines, especially such as are used as *winding* engines, a pair of coupled horizontal cylinders are now used; and in the larger form of horizontal engine two cylinders of high and low pressure are placed either side by side or one before the other. In cases where the cylinders are vertical the other general arrangements are much the same as in the horizontal engine.

(2) In *Portable Engines* the boiler and engine go together, the boiler being undermost; and the whole is supported upon four wheels, by means of which it is moved from place to place. The chimney is turned down over the boiler when not in use. A kind of engine known as semi-portable consists of a boiler and engine placed together, but without wheels.

(3) The *Road-locomotive* was first suggested by William Symington in Scotland, and developed for practical purposes about 1800 by Oliver Evans in America and Trevethick in Wales. It was used to propel carriages from town to town, but the badness of the turnpike roads and the subsequent introduction of railways brought the road-locomotive, as a means of transit, into disuse. In a modern form it is employed to draw heavy loads along the highway or over fields in farming operations. The chief characteristic of this *traction engine*, as it is called, is the great width of the wheels, which are now supplied by some makers with protected india-rubber tires to prevent slipping. It can be made to run backwards and forwards by means of reversing gear, while its course is guided by a steering wheel acting upon a vertical shaft.

(4) The *Railway-locomotive* is a steam engine and boiler placed upon wheels and employed to transport a train of wagons

or carriages upon a railway. Various attempts had been made to construct a steam engine to run upon rails by Blenkinsop (1811), Blackett (1812), Hedley (1813), Dodds & Stephenson (1815), and others. It was not, however, until the opening of the Liverpool and Manchester Railway in 1829 that the modern high-speed locomotive came into use. Upon that occasion a prize of £500 was offered for the best locomotive, and this was gained by an engine called the 'Rocket,' built by George Stephenson. This locomotive, which ran on four wheels, weighed 4 tons 5 cwts., and the tender, consisting of a simple cask, 3 tons 4 cwts.; the steam cylinders were 8 inches in diameter with 16½ inches of stroke; the driving-wheels were 4 feet 8½ inches in diameter; the total gross weight drawn was about 17 tons; and the speed attained was an average of 14 miles per hour, with an occasional speed of 29 miles per hour. In his engine of the 'Rocket' there were brought together the three primary elements which, having been developed, make the efficiency of the modern locomotive — viz.: the internal water-surrounded firebox and the multitubular flue in the boiler; the blast-pipe, from which the waste steam of the engine was exhausted up the chimney; and the direct connection of the two steam cylinders, one on each side of the engine, with the driving-wheels, on one axle. From this early locomotive the two modern types, differentiated by the position of the cylinder, have been developed. In the *inside cylinder* locomotive the cylinder is situated within the framing, under the boiler, with the main driving-axle cranked at two points to receive the power from the two cylinders; while in the *outside cylinder* locomotive the cylinder is external to the framing and connected, not to the axle, but to the crank-pins fixed between the spokes of the wheels in connection with the nave. Another point of advance on the early locomotive is in the number of the wheels. These now vary from six to twelve, and in some locomotives, where heavy loads are drawn on inclines, a greater tractive power is secured by coupling three or even four wheels together upon one side. A system has been recently adopted of putting four wheels in front of a locomotive on a small truck or *bogie*, which turns upon a central pivot and adapts itself to the curves of the lines, so that the tractional resistance is lessened. The principle of the expansion of steam in high-pressure and low-pressure cylinders has also been adopted, in order to save fuel, in some recent locomotives. The express passenger engine of the modern type now forms a striking contrast to the engine of the 'Rocket'; it weighs from 50 to 100 tons; its cylinders are from 17 to 19 inches in diameter, with a stroke of about 26 inches; the driving-wheels are from 7 to 8 feet in diameter; and the speed attained, 50 to 60 miles per hour. The modern freight engine is still heavier and has an enormous drawing power.

(5) The earliest forms of *Marine Engine* seem to have been devised by Rumsey and Fitch of the United States and Miller and Symington of Scotland, the earliest successful one being that of Robert Fulton, which he used in the 'Clermont' (see *Steamboat*). In Great Britain the first passenger steam vessel was the 'Comet,' built (1812). It had side paddle-wheels and was driven by a kind of inverted beam engine, with a single vertical cylinder, developing four or five horse-power. These early marine engines were constructed in a manner similar to Watt's land engine, but the position of the beam so high above the deck was soon recognized as a defect, especially in sea-going steamers. Instead, therefore, of a beam placed above the cylinder and piston, two beams or levers were placed below, one on each side of the engine, and the connecting-rod conveyed the power to the crank upwards instead of downwards. This design, however, was soon afterwards discarded in favor of an arrangement by which the cylinder was placed beneath and connected directly with the crank. A further improvement was secured by an *oscillating cylinder*, which moved right and left with the swing of the crank and enabled the piston-rods to be connected directly with the cranks. When the paddle-wheel was superseded by the screw-propeller a totally different type of marine engine was required. In this case the cylinder was inverted and placed above the shaft of the screw near the deck, and the connection with the crank was formed by means of an ordinary connecting-rod. In ships-of-war a horizontal direct-acting engine was adopted in order to keep the machinery below the water-line and out of danger from the enemy's guns. This took various forms, a recent one being the inverted vertical direct-acting engine, used in nearly all the large ocean steamers. These engines were commonly constructed with a two-cylinder compound arrangement, but this has been rapidly superseded by a three-crank triple-expansion engine first designed in 1874 by Mr. A. C. Kirk. This form of marine steam-engine has been found to effect a considerable saving in fuel, and the principle of expanding the steam has even been

used in a four-cylinder quadruple-expansion engine with success. A compound engine is one having two or more cylinders, and in which the steam after doing work in the first or high-pressure cylinder completes its expansion in the other cylinder or cylinders. The term 'compound' is commonly restricted to engines in which the expansion takes place in two stages only: high and low pressure, the terms 'triple-expansion' and 'quadruple-expansion' engines being used when the expansion takes place respectively in three and four stages. Steam turbines (q. v.) are peculiarly adapted to driving electric generators, because of the high speed of rotation; they are also widely used for propelling ships. The simplest type of steam turbine is a wheel similar to a water wheel, which is moved by a jet of steam impinging at high velocity on its blades. The De Laval turbine is of this class, and developments of it are seen in the Zolley or Rateau turbine. Other steam turbines are the Parsons, reaction type; the Westinghouse double-flow turbine; the Curtis turbine; the Spiro turbine, and others.

Fig. 1 shows a side and a plan view of a modern simple, horizontal, slide-valve engine with throttling governor. The heavy casting, H, serves as a frame to hold all the moving parts in proper alignment. It carries the cylinder casting, C, the cross-head guides, g-g, and the bearings for the crank shaft, S. In both views the cylinder wall is partly cut away to show the piston, the valve, and the steam ports. The piston, P, is fitted accurately to the bore of the cylinder and is further fitted with one or two narrow rings which lie in grooves around its cylindrical surface and are pressed outward against the cylinder wall either by their own tension or by springs in the bottoms of the grooves. By this means steam is prevented from passing the piston. The piston rod, R, is surrounded by steam-tight packing in a stuffing-box, b, where it passes through the front cylinder head. It can thus move in and out freely without allowing the escape of steam from the cylinder. At its front end the piston rod, R, is firmly fixed in the cross-head, K, which slides in the parallel guides, g-g, and transmits its motion through the connecting rod, M, to the crank. The straight-line motion of the piston is thus converted into rotary motion of the crank shaft and fly wheel, F. The slide valve, V, which controls the admission and release of steam from the cylinder, is moved by the eccentric, E, which rotates with the shaft, S, the motion being transmitted through rods A and B.

When steam is supplied to the engine it passes through a balanced valve controlled by the governor, G, into the steam chest, T. As indicated by the arrow the engine is turning in such a direction that the piston is just beginning its motion toward the right. Steam enters the left hand end of the cylinder through port p_1, pushing the piston toward the right. At the same time port p_2 communicates with the exhaust pipe through exhaust port p_3, allowing the escape of any steam contained in the right hand end of the cylinder. As the piston moves farther to the right the eccentric, E, rotating with the shaft, moves valve V to the left closing port p_1, but still keeping p_2 open to the exhaust. The closing of port p_1 is called the point of cut-off and occurs when the piston has completed from one-fourth to one-half of its stroke, depending upon the setting of the valve. Up to the point of cut-off steam has entered the cylinder at full boiler pressure, but after the inlet port is closed no more fresh steam is admitted on that stroke, that already contained in the cylinder expanding with a gradually decreasing pressure throughout the remainder of the stroke. When the piston has reached the right hand end of the cylinder, valve V has moved to the left so as to connect p_1 and p_3 and to uncover p_2 to the live steam in the steam chest, T. A charge of steam now enters the right hand end of the cylinder as already described and as the piston is forced toward the left the waste steam in that end of the cylinder is forced out through the exhaust. Engines operating in this manner are called double-acting engines since the steam works successively on both sides of the piston. Most of the early engines and a few modern ones of special design are single acting, the steam working against only one side of the piston, the other side being exposed to the atmosphere. A few engines for special purposes use steam throughout the full stroke at full boiler pressure. The general practice is to use it expansively, that is to have the cut-off occur at from one-fourth to one-half the stroke. The latter method is more economical as the temperature of the exhaust steam is lower which means that less heat energy is being thrown away in the exhaust. To further prevent the loss of heat the cylinder is covered with a jacket, J, of asbestos or similar good insulating material held in place by a thin metal shell.

In this type of engine speed regulation is accomplished by the throttling governor, G, which is driven by a belt from a pulley on the engine shaft. When the

engine runs too fast the two fly-balls on the governor which are revolving in a horizontal plane swing out in a wider path raising the large center weight and the attached rod which controls a balanced valve within the steam pipe. The valve operates to reduce the amount of steam admitted to the engine thus cutting down the speed. When the speed falls too low the fly-balls fall inward opening the valve and admitting more steam to the cylinder. A second method of regulation called the automatic cut-off, accomplishes speed control by changing the point of cut-off in the stroke. The centrifugal governor is incorporated in the fly wheel or is built on the engine shaft. When the speed is too high the governor advances the eccentric on the engine shaft making the cut-off occur earlier, when the speed is too low the cut-off is retarded. By this means a shorter or longer part of the stroke is made with full boiler pressure and the speed consequently reduced or increased. The latter type of governor gives closer regulation of speed but is more expensive to construct.

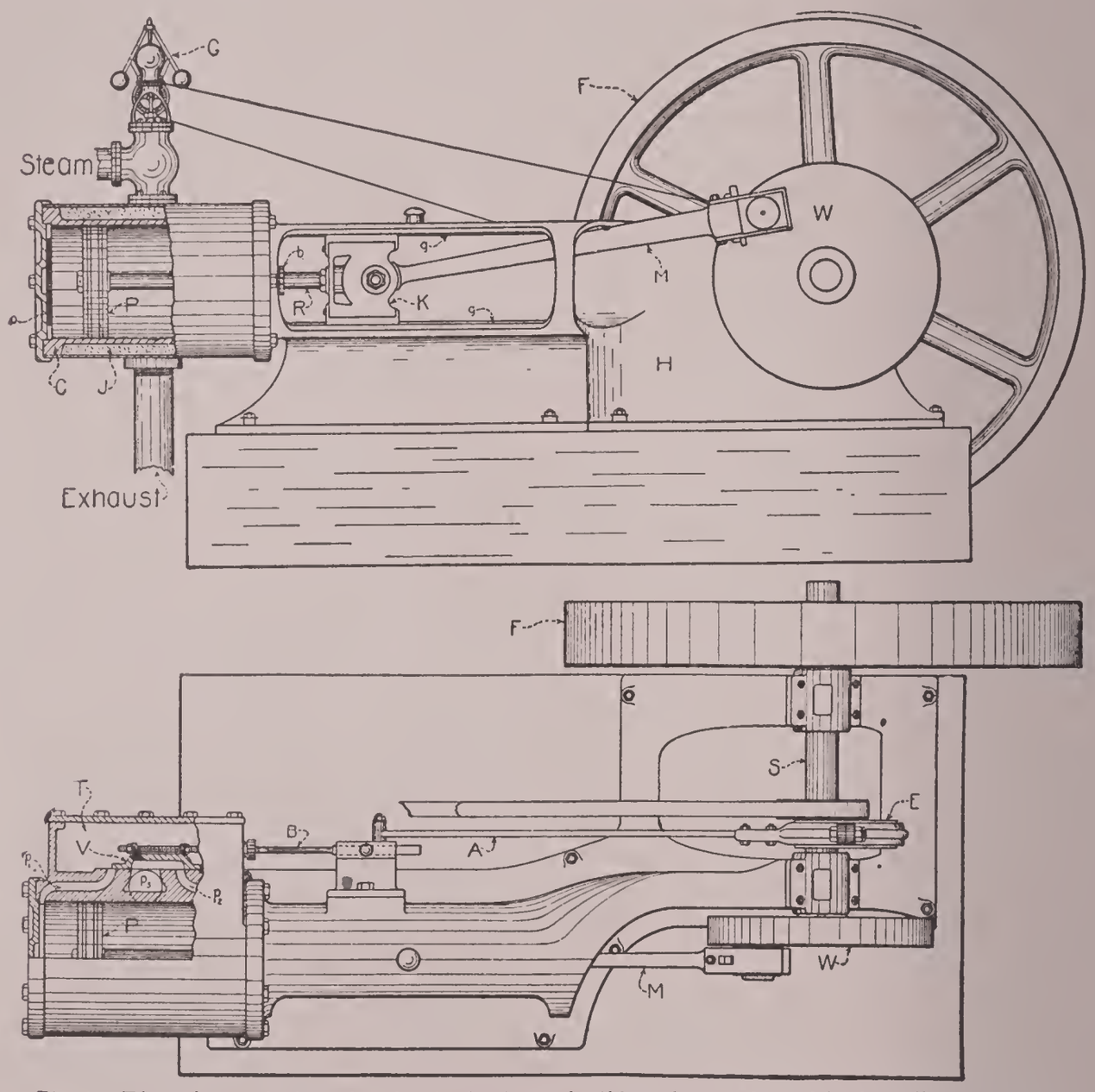


Fig. 1. Elevation and plan of a simple, horizontal, slide valve engine with throttling governor.

If an engine is to be run condensing the exhaust pipe is connected to a condenser which is a closed vessel, usually of cast iron, having inside either a spray of cold water or a large number of small tubes through which cold water circulates. The exhaust steam from the engine, coming in contact with the cold spray or cold tubes is condensed, forming a vacuum in the condenser. It is

evident that if the engine exhausts into the atmosphere it works against the pressure of the atmosphere. If it exhausts into the vacuum of a condenser this back pressure is removed, which amounts to about fourteen pounds per square inch. The saving in steam due to condensing may be as high as twenty to twenty-five per cent.

The engine described is a simple one. In larger units or where it is desired to obtain greater economy in the use of steam, the exhaust from one cylinder is passed into a second, larger cylinder and there further expanded. Such an engine is designated as a compound engine. Three, and sometimes four cylinders are used in this manner, forming triple or quadruple expansion engines. They are used largely as marine engines and pumping engines. The quadruple expansion pumping engine has been known to give a higher efficiency than any other form of steam engine.

A new type of steam engine, the invention of Prof. Johann Stumpf, Charlottenburg, Germany, has been developed since about 1910. Fig. 2 is a section through the cylinder of this Una-flow engine. The cylinder is about twice as long as in a simple engine of the usual form having the same length of stroke. The piston, P, is as long as the stroke less the width of the exhaust ports, h h. Steam from the boiler enters at S-S and fills the space around the valves, V V, and the jacket spaces. J J. Admission of steam to the cylinder is controlled by valves, V V, which are operated by the eccentric on the engine shaft through rod, G. Suppose the piston to be in the position shown and the valve at the right hand end of the cylinder to open admitting steam. The piston moves toward the left and in doing so closes up the ring of exhaust ports, h h, around the center of the cylinder. When the piston has traversed one-quarter or less of the stroke, according to the set of the valve gear, the valve closes cutting off the steam. That already in the cylinder expands with gradually decreasing pressure through the remainder of the stroke until the piston has moved to the extreme left, uncovering the ports, h h, when it escapes into exhaust belt, B, and exhaust pipe, E. When the piston closes ports, h h, at the beginning of the stroke any steam or air in the left-hand end of the cylinder is trapped there and highly compressed. Thus when the piston reaches the extreme left, and the valve at that end opens admitting steam, the pressure within the cylinder has already been raised so as to nearly equal that of the live steam. This prevents shock when the steam is admitted and causes the engine to run more smoothly. As the piston moves to the right the spent steam in that end is compressed in the same manner. The engine is double-acting but the steam flows in at the ends of the cylinder and out at the middle, hence the name Una-flow, or unidirectional flow. In the ordinary steam engine fresh steam at a high temperature flows in at the end of the cylinder, giving up some of its heat to the cylinder walls. When this steam, expanded and relatively cool, is exhausted it passes out through the same port by which it came in, carrying away much heat from the cylinder walls. The Una-flow engine obviates this and makes possible a much greater degree of expansion with resulting increased econ-

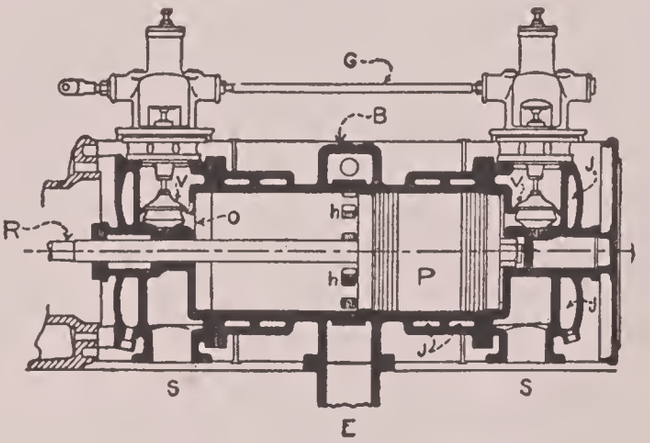


Fig. 2. Section of Cylinder. Stumpf Una-flow Steam Engine.

omy. Its promoters claim for it as good efficiency as is ordinarily attained with compound or triple expansion engines.

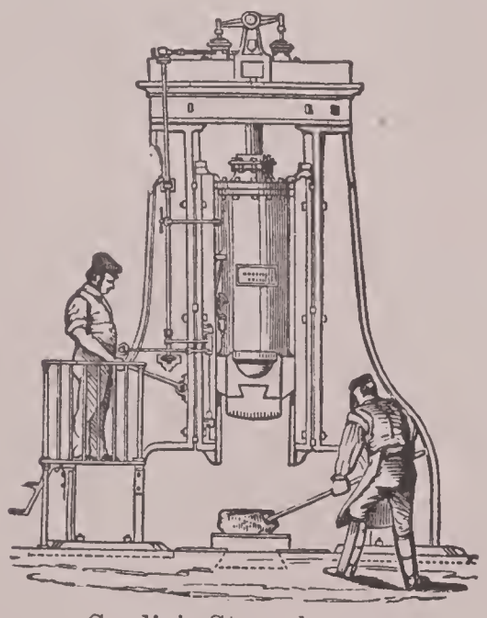
The steam engine has been adapted to the requirements of every line of work to which power is applied and as a result may be seen in very diverse forms ranging from the ponderous stationary engines in central power plants to the very light designs used in motor vehicles. Although the application of steam power to transportation was begun with the development in England of numerous 'steam carriages' or 'road locomotives,' some of which showed remarkably good design, the greatest effect upon travel and communication was brought about by its use on railways. Much of the rapid progress of civilized peoples has been due to the increased facility for transportation of products and persons brought about by the invention of the steam locomotive. The steam tractor has until recent years been an important factor in the tilling of farm land in western United States. Its use has diminished with the development of the internal combustion tractor. Although for large installations in central power plant work

the steam turbine has largely superceded the reciprocating engine, still the latter is and will continue to be used for small units where expert attendance is not maintained.

Steamer Duck (or RACE-HORSE DUCK), (*Micropterus brachyptĕrus*), a species of marine duck from 35 to 40 inches in length, distinguished by its small, short wings, and the swiftness with which it paddles over the surface of the water. It is found in Patagonia and the Falkland Islands.

Steam-gauge. See *Gauge*.

Steam-hammer, a machine employed in making large iron and steel forgings, and consisting usually of a steam-cylinder and piston with a metal striker placed vertically over an anvil. In the hammer invented by James Nasmyth, about 1839, and patented in 1842, the first steam-hammer to come into practical use, the cylinder is fixed, and the hammer-head attached to the lower end of the piston-rod delivers its blows by the direct action



Condie's Steam-hammer.

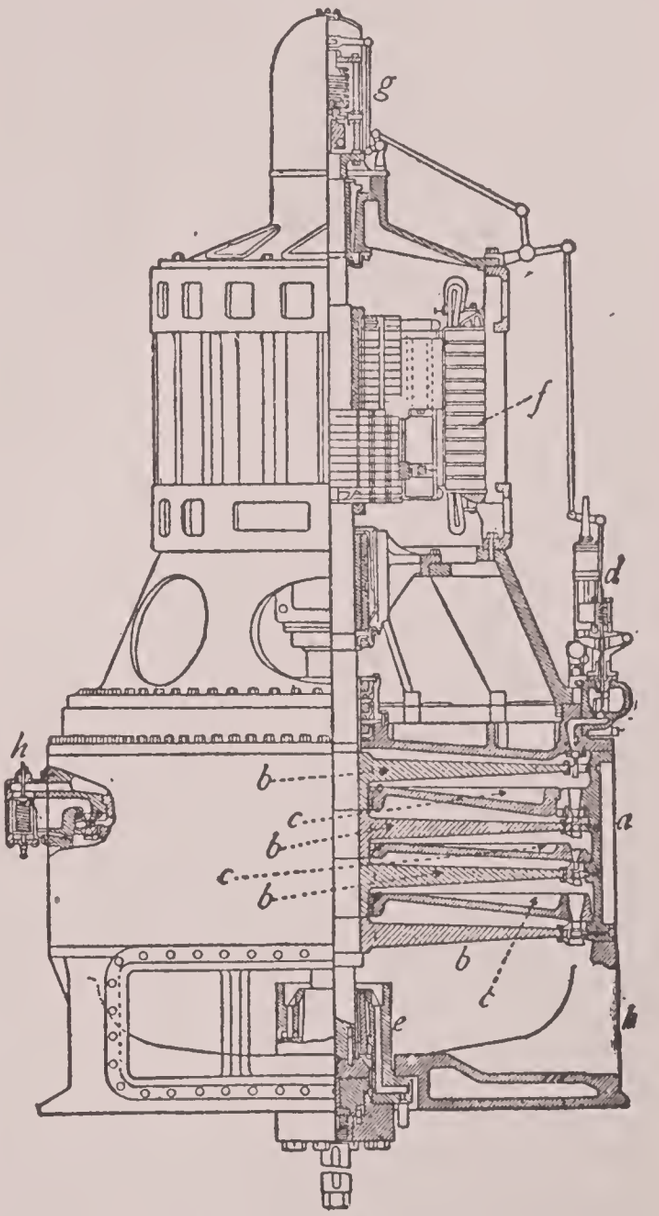
of the steam in the cylinder. In operation the steam is introduced into the cylinder immediately below the piston, and it raises the hammer between the guides to the required height. The steam being then cut off, and the exhaust-valve opened, the hammer descends with a velocity augmented by the compression of the air above the piston. In 1861 Robert Wilson, who had made various improvements in the Nasmyth hammer, adopted the plan of admitting steam above the hammer, thus greatly increasing the force of the blow. By means of the valves and valve gearing the person in charge of the machine has complete control over the slightest movement of the hammer. In Condie's steam-hammer the piston-rod is attached to the top of the hammer frame, and the cylinder is movable; the hammer-head is attached to and falls with the cylinder, which thereby adds an additional weight to the blow. In the duplex steam-hammer patented by Ramsbottom the anvil is discarded, and two hammer-heads of equal weight deliver their blows upon the forging horizontally. From the increased size of gun forgings the steam-hammer has now attained enormous proportions, hammers having been used of 100 tons or more in weight. Powerful hydraulic presses have, in recent years, been substituted for the steam-hammer in heavy forging work, but the hammer is preferred for lighter work.

Steam Navigation, the navigation of ships in which steam is the sole or main propelling power. As early as 1736 Jonathan Hulls in England patented a method of propelling a vessel by steam by means of a stern wheel. In America James Rumsey and also John Fitch succeeded in 1786 in constructing each a vessel that was actually driven by steam; and in Scotland in 1788 Patrick Mills and William Symington constructed a steamboat in which paddle-wheels were used. This idea was improved upon by Robert Fulton (1807), the success of whose boat has given him the reputation of being the inventor of the steamboat. A number of steam-vessels on the model of Fulton's *Clermont* were soon after plying on American waters and steamboats in the following years increased rapidly in numbers, both in the United States and in Europe. In 1819 a steamship, the *Savannah*, made the voyage to Liverpool from America in twenty-six days, its capacity as a sailing vessel being partly aided by steam. It was not until 1838, however, that regular steamship communication was established across the Atlantic. In that year the *Sirius* steamed from London to New York in seventeen days; and a few months afterwards the *Great Western* made the voyage from Bristol to New York in fifteen days. These were all paddle-steamers, and that type of vessel culminated in the *Scotia* (1861) of the Cunard line, which made the passage to New York in nine days. The measurements of this vessel were: length 366 feet, breadth 47 feet 6 inches; cylinder diameter 100 inches with a stroke of 12 feet, and the engines were of the side-lever type. Meanwhile various experi-

ments were made with the screw-propeller (which see). Modern vessels, and especially men-of-war, are frequently fitted with a pair of screws, the advantages being that the necessary propelling area may be got at a lower depth; while, by reversing one and letting the other go ahead, the vessel may be turned without a rudder and without steerage way. Working independently, one screw may be used without the other. Three and four screws have also been fitted. The modern type of ocean steamer is built of steel, and remarkable speed has been attained, the length of a voyage from England to New York having decreased from 9 days in 1856 to less than half that time. The most important development of the twentieth century in steam navigation has been the introduction of the turbine and internal combustion engines.

Steam-shovel, a machine employed in large operations for excavating earth or loose material of any kind. It is essentially a locomotive crane adapted for operating a mammoth dipper or bucket. The bucket is made of iron or steel and is carried on a boom so arranged that the bucket can be swung in any desired direction and can be run in or out, being carried at the end of a strong beam called the dipper-handle. The cutting-edge of the dipper is furnished with pointed teeth to allow it to dig into hard material and to protect the edge when working in rock. The bottom of the dipper is hinged and is released by a cord attached to a catch that holds it closed while the dipper is being filled. The capacity of the bucket is from three-quarters of a cubic yard to five cubic yards. In operation, rails are laid, over which the steam-shovel can travel up to the face of the cutting. The wheels of the car on which the shovel is mounted are then blocked. The bucket is held up to the face of the work by compensating gear. The mechanism is set in motion, and the bucket enters the earth. The dipper is pushed forward and upward, becoming filled; it is then swung round and emptied into a wagon, railway car or whatever means are employed for disposing of the material. A shovel of this type can handle from four to five thousand cubic yards of rock or ore per day. A performance is recorded of 32,000 cubic yards of material in six consecutive days of ten hours each. Steam-shovels were of great service in the work of excavating for the Panama Canal, sixty-three of them being in use there at one time. In fact, without the steam shovel it is unlikely that the construction of the canal would have been undertaken, as it is certain that it could not have been brought to completion in anywhere near the time it actually was finished. The accompanying illustration gives an excellent idea of its general appearance and method of operation.

Steam-turbine (tur'bin), an application of the turbine principle to steam engines, which has recently been applied with much success to ocean steamers of the greatest size. In this type of engine no cylinder is employed, the motion being produced



Curtis Vertical Steam-turbine.

a, Turbine-chamber or -casing; *b, b, b, b*, revolving disks, or turbine-bucket elements of the rotor; *c, c, c*, guide-disks, or fixed elements of the stator forming the stages of the turbine; *d*, valves admitting steam to the nozzles (these are controlled by linkage to the governor *g*); *e*, footstep, carrying the vertical weight of turbine, generator, and shaft; *f*, dynamo or electric generator; *g*, governor to control speed and power; *h*, by-pass adjusting-valve; *k*, outlet to condenser, carrying away used steam.

by the pressure of the steam on the rims of a revolving turbine wheel. Long used economically in connection with water power, the turbine first came into competition with the ordinary steam engine in 1884, when the Parsons' steam turbine was first employed. De Laval's invention came into the market in 1889, and some others of importance have since been made. The most effective of the steam turbines consist of a long series of rings of moving blades, between which are rings of fixed blades. The latter serve as guides to direct the steam against the moving blades. As a result, the revolving drums on which these are mounted are set in swift rotation. When used in vessels, this gives rapid rotary motion to the propeller shaft. First tried as a marine engine on the torpedo boat *Turbinia* in 1897, it has since been applied to vessels of various kinds, these increasing in size until the great ocean steamships *Mauretania* and *Lusitania* were reached. The steam turbine is also used as a source of power for many other purposes. To obtain the highest efficiency it must be rotated at great speed, and a reduction of this speed by gearing is a matter of importance, especially in the case of steamship propellers. An invention recently made by Rear Admiral G. W. Melville, formerly chief engineer of the United States Navy, and J. H. M'Alpine, is said to produce the desired effect.

Steam-whistle, an arrangement connected with the boiler of a steam-engine for the purpose of making a loud whistling sound. In the locomotive steam-whistle a tube, fixed to the head of the boiler and opening into its interior, is commanded by a stop-cock; the tube ends in a portion perforated with holes and surrounded by a thin brass cup; and the tube and cup are so adjusted as to leave a narrow opening all round. Above this opening a thin brass cup is fixed in an inverted position so as to present a sharp edge to the orifice. When the stop-cock is opened the steam rushes through this orifice with great violence, and in coming in contact with the sharp edge of the cup it produces a loud, shrill sound. Steam-whistles can be made to give off musical tones by graduating the length of the pipe or cup.

Steam-winch (winsh), a form of hoisting apparatus in which rotary motion is imparted to the winding axle of the winch from the piston-rod of a steam-engine.

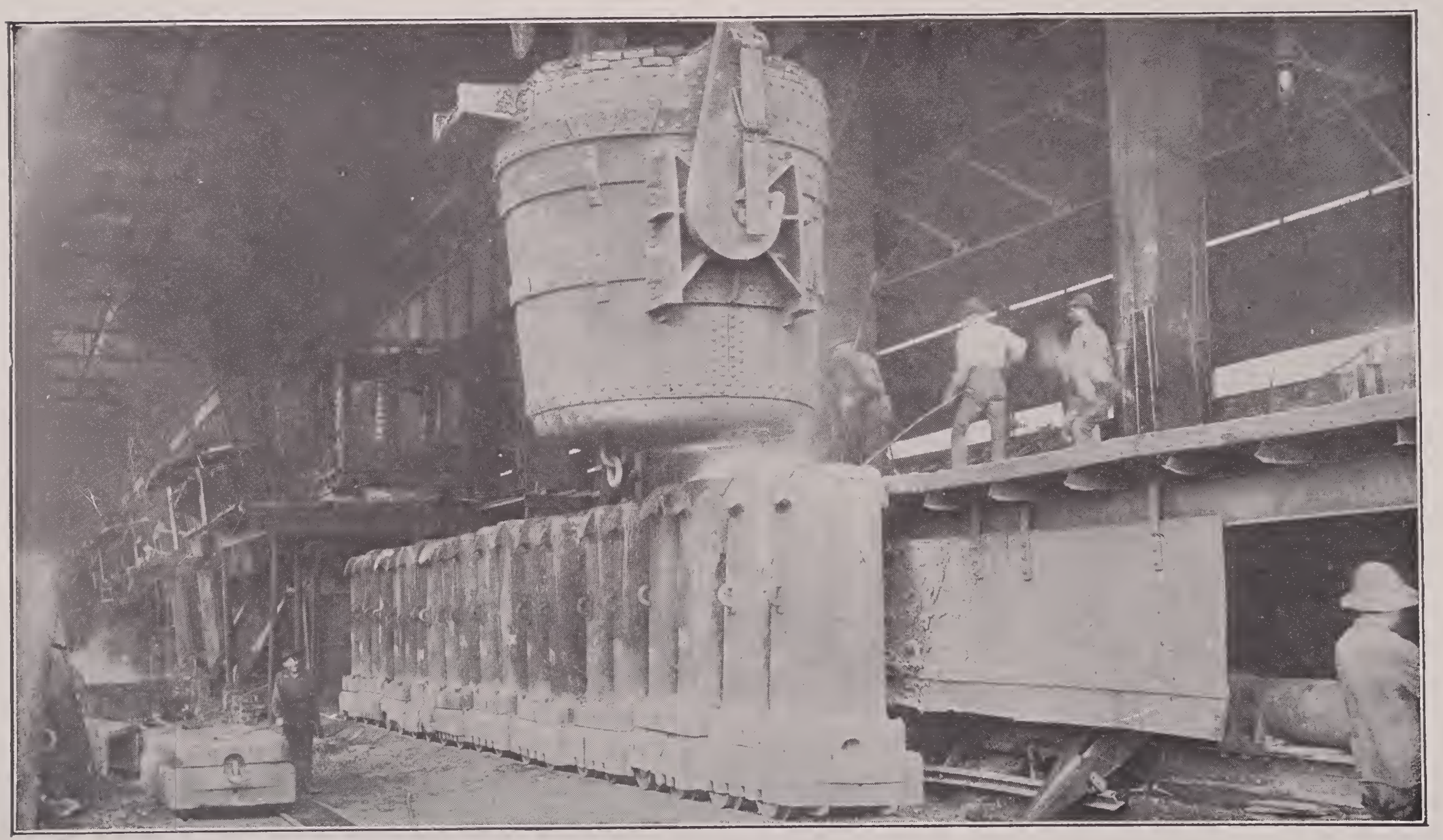
Stearic Acid (stē'a-rik; $C_{18}H_{36}O_2$), is one of the most important and abundant of the fatty acids. As stearine it exists, in combination with glycerine, in beef and mutton fat, and in several vegetable fats. Stearic acid, which is inodorous, tasteless, insoluble in water but soluble in alcohol, forms white scaly crystals, and combines with alkalies, earths, and metallic oxides to form stearates. It burns like wax, and is used in making candles.

Stearine, STEARIN (stē'a-rin; $C_{57}H_{110}O_6$), the chief ingredient of suet and tallow, or the harder ingredient of animal fats, oleine being the softer one. It is obtained from mutton suet by repeated solution in ether and crystallization. It may also be obtained by pressing tallow between hot plates, and afterwards dissolving in hot ether, which on cooling deposits the stearine. It has a pearly luster, is soft to the touch, but not greasy. It is insoluble in water, but soluble in hot alcohol and ether. When treated with superheated steam it is separated into stearic acid and glycerine, and when boiled with alkalies is saponified, that is, the stearic acid combines with the alkali, forming soap, and glycerine is separated. When melted it resembles wax.

Steatite (stē'a-tīt), or SOAPSTONE, a sub-species of rhomboidal mica. It is of two kinds, the common and the pagodite or lardstone. It is a compact stone, white, green of all shades, gray, brown or marbled, and is soapy or unctuous to the touch. It is used in the manufacture of porcelain, in polishing marble, in diminishing friction in machinery, and as the basis of rouge and other cosmetic powders.

Stebbins (steb'inz), GEORGE COLES, an American singing evangelist, born at East Carlton, Orleans Co., N. Y., Feb. 26, 1846. He was for a time director of music at Tremont Temple, Boston, and in 1876 entered evangelistic work with D. L. Moody. He collaborated with Ira D. Sankey and James McGranahan in preparing a number of hymn-books. He was author of the Northfield Hymnal (1904).

Stedman (sted'man), EDMUND CLARENCE, an American poet and essayist, born at Hartford, Conn., Oct. 8, 1833; died in New York, Jan. 18, 1908. He studied at Yale, engaged in journalism, and was a member of the New York Stock Exchange from 1865 until 1900. His works include *Victorian Poets*, *Poets of America*, *Victorian Anthology*, several volumes of verse, and a *Library of American Literature*, edited in collaboration with E. M. Hutchinson. *The Life and Letters of Stedman* was published in 1910.



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POURING STEEL INTO MOULDS

The great ladle in the upper portion of this picture is filled with steel at the furnace. A travelling crane then takes it to the train of flat cars on which the moulds stand and the steel is poured. After cooling, the moulds are removed and the steel in the form of a "billet" is taken to the next process in manufacture.

Steel, the term applied to metallic iron when combined with carbon. Depending upon the percentage of carbon in composition, steel, which contains from almost no carbon up to 2 per cent, lies between wrought iron which contains less than .1 per cent, and cast iron which may contain from 2 to 10 per cent. (See *Iron.*) Beside the essential carbon and iron, steel will contain other elements in small quantities, manganese, silicon, phosphorus, and sulphur, some of which are present for specific purposes, others because present in the ore from which the steel is indirectly made and cannot conveniently be eliminated during manufacture. The percentage of carbon determines the mechanical properties, i. e., those properties which make it commercially useful, such as hardness, tenacity, elasticity, ductility, etc., the higher the carbon the harder the steel and the greater the tenacity—elasticity and ductility decreasing with greater hardness. Steels may be divided into two general classifications: plain *carbon steels*, containing only small percentages of elements other than carbon, and *alloy steels* (q. v.) which contain sufficient proportions of other metals such as manganese, nickel, chromium, vanadium, molybdenum, tungsten, etc., as to enhance certain of the mechanical properties.

Steel is bright grayish white in color, the texture may be granular or fibrous, the specific gravity will vary from about 7.50-7.90. The value of steel depends greatly upon the possibility of altering its mechanical properties by *heat treatment.* If heated above a certain temperature known as the *critical temperature*, it assumes the property of hardening if cooled suddenly (*quenching*), or of becoming soft if cooled very slowly (*annealing*). Hardened steel is generally too brittle for use and must be *tempered* by being heated slightly, when the toughness and elasticity will be increased. The polished surface of a piece of steel will assume colors, varying from straw through brown and purple to blue, when being tempered; these serve to indicate the degree of elasticity and softness assumed, and are used by workmen as a guide to the progress of this operation. With modern practise, necessitated by the demands of production, tempering is done in baths of heated oil or molten lead which ensure greater uniformity of product.

The grade of steel is indicated by the process by which it is made; either from wrought iron by increasing the carbon, or from pig iron by removing the excess carbon and other impurities by chemical reactions in the furnace. *Blister steel*, named from the appearance of the finished product, is made from bars of very pure wrought iron which are heated to a high temperature in contact with charcoal, the iron absorbing carbon from the charcoal by what is known as *cementation. Shear steel*, which is made by piling up bars of blister steel and forging at high temperature into a single bar. Blister and shear steel, because of the length of time and the amount of fuel required, have been largely superseded in this country by *crucible steel*, although these are still manufactured extensively in England. The chief processes in use in the United States are as follows:

(1) The *Bessemer process.* This, it appears, was invented almost simultaneously in 1856 by Henry Bessemer in England, and an American, Wm. Kelly, of Eddyville, Ky. This process, which on its introduction practically revolutionized the steel industry, consists in blowing air under pressure through a bath of molted pig iron contained in a suitable iron vessel, called a *converter*, lined with refractory materials, whereby the silicon, manganese, and carbon present in the iron are literally burned out by the oxygen in the air, leaving a refined iron. Briefly the procedure is as follows: The charge of molten pig iron is run from the furnace to the converter, which is shaped like a large widemouthed bottle with neck slightly bent sideways, formed of iron plates and lined with a silicous sandstone, called firestone. The converter is mounted on trunnions, which allow it to swing forwards for charging. One of the trunnions is hollow and serves to conduct the air for the blow from the compressors to the bottom of the converter. After charging, the converter is swung back into vertical position and the air blast turned on. Chemical action between the oxygen of the air and the various impurities in the metal immediately takes place, raising the temperature, and is indicated by the appearance of the flame issuing from the mouth of the converter, which serves as a guide to the workmen for the several stages of the blow and when this is completed. In order to neutralize injurious oxides which are formed during the blow and to improve the quality of the steel, carbon and manganese are added either as *ferro-manganese* or *spiegeleisen* in the ladle into which the metal is poured previous to casting. The entire time required to convert fifteen to eighteen tons of pig iron into steel requires only about 15 minutes.

Numerous variations and improvements have been made in the process since the original work of Bessemer. The most notable being the *Thomas-Gilchrist* or *basic* process in which the converter is lined with calcined dolomite, and about 15 per cent of lime added to the bath before beginning the blow. The difference between the basic and the ordinary, or *acid* Bessemer process is in the chemical reactions by means of which the impurities are removed from the iron. The advantages of the basic process is that, in addition to other impurities, phosphorus may be gotten rid of, which is not possible in the acid process. Due to natural limitations which restrict the Bessemer processes to the use of iron made from certain grades of ore, Bessemer steel is gradually being supplanted by steel made by the following process:

(2) The *Open Hearth process* originally invented by William Siemens in England, later perfected by the Martin Brothers, and hence known as the *Siemens-Martin process* has been in commercial use since about 1870. A rectangular *regenerative* furnace made of brickwork supported by iron rods and beams, which may vary from 25 to 100 tons capacity, is charged with pig iron and steel scrap, or with pig iron and ore, the heat for the melting and chemical reactions being secured by passing burning gas over the top of the materials which are contained in a shallow bath or *open hearth.* The gas, with air for combustion, is introduced through ports at each end of the furnace alternately. In consequence of the large capacity of the modern open hearth furnace charging by manual labor is out of the question. This difficulty has been overcome by the *charging machine* which has been especially designed for the purpose. It is operated electrically and dumps the raw material, which is previously placed in charging boxes (capacity about 16 cubic feet), directly into the furnace. With its assistance a 50-ton furnace may be completely charged in a very short time. The gaseous products of combustion pass out, through the port temporarily not used for entrance of gas, into chambers partly filled with brick, called *checkers*, which thus become heated, and thence out through the stack. After a short interval (about 20 minutes) the direction of flow of gases is reversed, these now entering through the side just used for the outgoing gases after having become slightly heated through contact with the hot checker bricks and thus generating a higher temperature in the furnace. The utilization of the heat from the products of combustion, which would otherwise be wasted, is thus accomplished, and embodies the regenerative principle of the furnace. The essential features of the process are the reduction of the carbon in pig iron by oxidation with iron ore, or its dilution by the addition of steel scrap. The greater flexibility of the process as regards control of temperature and elimination of impurities (hence enabling a wider variety of raw materials to be used, and a greater variety of steels to be produced) has caused it to supplant the Bessemer process. The process is either acid, as the lining of the furnace is composed of acid, silicous materials, or basic, in which case the lining is composed of magnesite bricks and dolomite. While the acid process produces the better grade of steel its use is limited, since phosphorus and sulphur, the two most injurious impurities in steel, are not removed; its use is therefore restricted to only such materials as are free from these. Through the reactions which take place in the basic process practically all phosphorus and considerable sulphur are removed, thus permitting the use of iron of any phosphorus content. In the United States this fact is of greatest importance since it renders available immense ore deposits not otherwise utilizable, hence the basic open hearth process has become the leading process in this country, and out of a total yearly production of over 40 million gross tons of steel more than 25 million gross tons are made by this process.

Various improvements have been made in recent years, both from the mechanical and metallurgical standpoint. Among the former the invention of the *tilting or rolling* open hearth furnace by Campbell and Wellman, in which the body of the furnace is mounted on rollers permitting tilting forwards or backwards ensures greater convenience in charging or discharging and facilitates production. Metallurgical improvements by Monell, Campbell, Bertrand-Thiel, Talbot and others have facilitated the removal of phosphorus, sulphur, and silicon through more energetic chemical reactions.

(3) The *Electric Furnace* is used chiefly for the further refining of steel made by the Bessemer or Open Hearth Processes since it yields a product superior to either of these. The furnace is closed, constructed of iron or steel and usually provided with basic lining. The heat is obtained from electrical sources, the various types of furnaces being broadly divided into two classes which

differ only in the method by which the heat is supplied, namely, (a) arc furnaces in which heat is produced by an arc maintained either between the metal and one or more carbon electrodes, or between electrodes above the metal, and (b) induction or resistance furnaces in which heat is generated by the resistance presented by the metal itself to low voltage currents passing through it. The charge consists either of already molten steel or of steel scrap or a combination of both. Chemical reactions which take place through the addition of lime and fluorspar remove such impurities as phosphorus and sulphur. As in the Open Hearth final additions are made of ferro-alloys in order that the product will have the desired composition. Although electric steel is a comparatively recent development its superior quality has caused it to be used extensively in automobiles, airplanes, engines, agricultural implements, tools, etc. More than four hundred electric steel furnaces are in operation in the United States, with capacities ranging from 1 to 60 tons.

(4) The *Crucible Process* was invented in England in 1740 by Huntsman, a Sheffield watchmaker. This process differs from any of the preceding in that it is not a refining but simply a melting and mixing process. The charge, which consists of very pure wrought iron, charcoal, ferro-manganese or ferro-alloys, in proper proportions to give the required composition, is placed in individual clay or clay and graphite crucibles containing from 50 to 100 pounds, which are then charged into a furnace designed to be run at a high temperature. When the ingredients have become molten, the crucibles are either poured individually into molds, or together into a ladle from which the molds are subsequently filled. Since no chemical reactions take place the purity of the finished product depends entirely upon the purity of the raw materials, and by properly selecting these a very pure high grade steel may be manufactured. Crucible steel is considered the highest grade and is used for springs, tools, cutlery, files, etc.; however, with the rapid advances being made by the electric furnace and the larger production of which it is capable it seems possible that at a not far distant date this will supplant the crucible process also.

When the manufacture of steel is finished the molten metal is poured into molds for castings, or cast into ingots which are subsequently heated and forged or rolled into bars, rails, structural shapes, shafting, etc.

The property possessed by steel of becoming hard when suddenly cooled appears to be due to a *solid solution* of iron and carbon which is formed when steel is heated above the critical temperature in which condition the steel assumes hardness, the sudden cooling, in oil or in water, retaining this condition when cold. The tempering operation, through heat, produces a partial decomposition of this solid solution and softens the material. The addition to the steel of manganese, chromium, tungsten and other elements materially retards this decomposition so that steels with a sufficient proportion of these elements will still retain hardness even when allowed to cool in air, and are hence called *air-hardening* steels. It has been found that the addition of alloying elements, either singly or in combination, greatly increases certain of the mechanical properties and thus gives a material which is specifically suited for a given purpose. (See *Alloy Steel.*)

Steele (stēl), Sir Richard, an English essayist, was born at Dublin in 1672, where his father was an attorney; he died at Carmarthen, Wales, in 1729. By the influence of his uncle, who was secretary to the Duke of Ormonde, Steele was educated at the Charter-house, where he formed a friendship with Addison, and at Oxford. In 1701 he published a prose treatise called *The Christian Hero*, the object of which was to reform the manners of the time. Its severe morality, however, brought ridicule upon its author (who was by no means over-strict in his own conduct), and, to establish his character as a wit, he wrote the comedies of *The Funeral*, *The Lying Lover*, *The Tender Husband*, and a number of years afterwards he added to these *The Conscious Lovers*. In 1707 he was appointed, by the influence of Addison, to the editorship of the *Gazette*. Two years later he started, and was afterwards aided by Addison in maintaining, a light miscellany called *The Tatler*, which, with its successors *The Spectator* and *The Guardian*, established the fame of the two friends as the first of English essayists.

Steel Engraving. See *Engraving.*

Steell (stēl), Sir John, a Scottish sculptor, was born at Aberdeen in 1804; received his art education in the Royal Academy, Edinburgh, and also in Rome. In the competition for a statue of Sir Walter Scott he gained the prize with the figure now seated in the Scott Monument in Edinburgh, and from the

time of its completion (1846) his success was assured. Among his better-known works, also in Edinburgh, are the statues of Wellington (1852), Professor Wilson, Allan Ramsay, Thomas Chalmers, Queen Victoria, and the Scottish memorial to the Prince Consort, on the inauguration of which in 1876 he was knighted. He died in 1891.

Steelton, a borough of Dauphin Co., Pennsylvania, 3 miles S. E. of Harrisburg, on the Pennsylvania and Philadelphia & Reading railroads. It has the most complete steel mills in the U. S., also glove factory, hosiery mill and cigar factory, seven large blast furnaces, etc. Pop. (1910) 14,246; (1920) 13,428.

Steelyard (stēl'yard), formerly a factory in London belonging to the Hanse merchants, who had long valuable trading privileges, and a certain measure of self-government, the internal discipline of their factory being half monastic and half military. Their factory was walled, and to this the Hanse merchants more than once owed their safety in popular risings, when Flemings and other foreigners were massacred. After the decline of the Hanse Towns (which see) the Steelyard remained in the possession of the free towns of Lübeck, Hamburg, and Bremen till 1853, when it was sold to some private speculators.

Steelyard, or ROMAN STEELYARD. See *Balance.*

Steen (stān), JAN, a Dutch painter, born at Leyden about 1626; died in 1679. He studied under Nicholas Knupfer and Van Goyen, and married the daughter of the latter. From the conflicting accounts of his career it appears that he was at one time a tavern-keeper, and the tradition is that he led a drunken and dissolute life; but in disproof of this his numerous paintings attest that he must have been a laborious and careful worker. He stands in the foremost rank among Dutch painters alike as regards execution, composition, and color, and the action, gestures, and expression of his figures. In the British National Gallery he is represented by *The Music Master*, but his chief paintings are to be seen in the galleries of The Hague and Amsterdam.

Steenbok. See *Steinbock.*

Steeple (stē'pl), any tower-like structure attached to a church, whether a tower proper or spire or a combination of tower and spire or tower and lantern.

Steeple-chase, a kind of horse-race across a difficult tract of country in which ditches, hedges, fences, and other obstacles have to be jumped as they come in the way. It is said that the name is derived from the fact that originally any conspicuous object, such as a church-steeple, was chosen as a goal, towards which those taking part in the race were allowed to take any course they chose. The steeple-chase course of the present day is marked out by flags, between which the rider must pass before he can win the race.

Steering Apparatus, the contrivance by which a vessel is steered, usually composed of three parts, viz: the rudder, the tiller, and the wheel, except in small vessels, where the wheel is unnecessary. The rudder or helm is a long and flat piece or frame suspended edgewise down the hind part of a ship's stern-post, where it turns upon a hinge to the right or left, serving to direct the course of a vessel, as the tail of a fish guides the body. The tiller is a bar of timber or iron fixed horizontally to the upper end of the rudder and projecting within the vessel. The movements of the tiller are effected in small vessels by hand, assisted by a tackle called the tiller-rope. In larger vessels there are, properly speaking, two ropes, or more commonly chains, which being wound about the axis or barrel of a wheel, act upon the tiller with the powers of a windlass. In large vessels a ponderous system of braces and tackle become necessary to assist the working of the wheel. This was remedied by the introduction of electric or steam-steering apparatus, which is a device connected with the tiller and controlled by the steering-wheel. There are numerous forms of apparatus, and manual labor at the wheel is now reduced to a minimum.

Steevens (stē'vens), GEORGE, a Shakespearean scholar, born in 1736; died in 1800. He collaborated with Dr. Johnson in an annotated edition of Shakespeare's works which was long the standard.

Stefansson (stef'ans-son), VILHJALMUR, a Canadian explorer, born at Arnes, Manitoba, November 3, 1879. He conducted several archaeological and ethnological Icelandic and Arctic expeditions; discovered the blond Eskimo found on both sides of Dolphin and Union Straits and Coronation Gulf; and in June, 1913, as commander of the Canadian Arctic Expedition, set out for four years' exploration north of Canada and Alaska, where he discovered new land in 73° 5′ N. latitude, 115° 43′ W. longitude. See *North Polar Expeditions.*

Stein (stīn), HEINRICH FRIEDRICH KARL, BARON VON, a German statesman, born at Nassau in 1757; died in 1831. He studied at Göttingen, entered the mining department of the Prussian government, became head of the mines and manufactures (1784) department in Westphalia, visited the mining districts of England in 1786, became president of the provincial chambers of Westphalia in 1796, and a minister of state in 1804. For the severity of his criticisms on the administration he was dismissed (1807), but in a few months he was recalled, with power to introduce his reforms. Accordingly he abolished serfage by edict, made military service obligatory on all classes, and rearranged the financial and administrative affairs. By means of these reforms he laid the basis of Prussia's future greatness, but in less than a year he was proscribed by Napoleon and dismissed from office. He afterwards visited St. Petersburg, and was instrumental in bringing about the coalition which crushed Napoleon. When the military struggle was over he spent his life in retirement. See *Prussia.*

Steinbock (stīn'bok), STEENBOK (stān'bok; *Nanotragus tragulus*), a small antelope found in South Africa. It is ashen gray on the sides, white underneath, stands about 2 feet in height, and its flesh is much esteemed. The male alone has short horns. The name is also applied in Europe to the ibex (which see).

Stellite, an alloy composed of cobalt and chromium, with molybdenum or tungsten as hardeners, of great use for cutting tools. It was invented by Elwood Haynes, of Portland, Ind.

Stelvio (stel'vē-ō), PASS OF THE, a military road leading over the Rhætian Alps between the Tyrol and Lombardy, constructed by the Austrian government and completed in 1824.

Stem, a curved piece of timber or combination of timber to which the two sides of a ship are united at the fore end, or the similar portion of an iron or steel vessel. The outside of the stem is usually marked with a scale of feet showing the perpendicular height from the keel.

Stem, in botany, the axis of growth of a plant above ground. The stem may be either herbaceous or woody, solid or hollow, jointed or unjointed, branched or simple, upright or trailing, etc. In some plants the stem is so short as to seem to be wanting, the leaves and flower-stalks appearing to spring from the top of the root. There are also stems, such as the rhizome and tuber, which, being subterranean, have been mistaken for roots. See *Botany.*

Stencil (stīn'sil), a thin plate of metal, leather, or other material, used in painting, marking, etc. The pattern is cut through the material composing the stencil, which is applied to the surface to be painted. The brush then being brought over the stencil, only the interstices representing the pattern receive the colors.

Stendal (sten'däl), a town in Prussia, province of Saxony, on the Uchte, 40 miles N. N. E. of Magdeburg. It has a cathedral of the fifteenth century, and manufactures of woolens, cottons, etc. Pop. (1905) 23,281.

Stenness (sten'nes), or STENNIS, a loch in Orkney, a few miles N. E. of Stromness, 14 miles in circumference. It is remarkable for the two groups of standing stones, somewhat similar to those of Stonehenge, which are found on its shores. The smaller group, of which only two remain erect, belong to an area 100 feet in diameter with an outside ditch 50 feet in width. The larger group, known as the Ring of Brogar, consists now of fifteen stones in an inclosure 340 feet in diameter. See *Standing Stones.*

Stenography. See *Shorthand.*

Stentor (sten'tur), a genus of infusorial animalcules. They are among the largest of the Infusoria, and are usually found adhering to the stems and leaves of aquatic plants.

Stephen (stē'ven), King of England, son of Stephen, Count of Blois, by Adela, a daughter of William the Conqueror, was born about 1105. His uncle, Henry I, gave him the earldom of Mortaigne, in Normandy, and large estates in England, in return for which he took the oath for securing the succession to Henry's daughter, the Empress Matilda. Yet when his uncle died he hastened from France to England and laid claim to the crown for himself (Dec., 1135), and was crowned in London. Nevertheless his seat on the throne, by reason of the disaffection of many of the nobility, was very insecure. Besides this, in 1138, David of Scotland invaded England to secure the claims of his niece, but in the battle of the Standard he was defeated by the northern barons (Aug. 22). In the following year the empress herself landed in England with her half-brother, the Earl of Gloucester, and a civil war ensued, in which Stephen was taken prisoner and Matilda acknowledged queen. The conduct of the new sovereign, however, excited an insurrection

against her government; and, being shut up in Winchester Castle, she escaped with difficulty, while the Earl of Gloucester was taken prisoner. Stephen was exchanged for the earl, and the war was renewed. When Matilda retired to Normandy (about 1147) the contest was taken up by her son Henry. Finally the struggle was brought to an end in 1153 by the Treaty of Wallingford, in which it was agreed that Stephen should reign to his death, and that he should be succeeded by Henry. He died the following year.

Stephen, Sir James, was born in London in 1789; died in 1859. He was educated at Cambridge, practiced as a barrister, became secretary of state (1834) for the colonies, and on his retiral he was appointed professor of modern history in Cambridge University. He was the author of *Essays in Ecclesiastical Biography* (1849), and *Lectures on the History of France* (1851).— His brother, Sir George (1794-1879), after studying medicine, became an attorney, and later a barrister; distinguished himself as an advocate for the abolition of slavery, and in bringing about reforms in connection with the police force and pauper relief; and was knighted in 1837.— Sir James Fitz-James Stephen, son of Sir James above, born 1829; died 1894. He was educated at Trinity College, Cambridge; called to the bar in 1854; became recorder of Newark-on-Trent (1859); legal adviser to the Indian Council (1869); professor of common law at the Inns of Court (1875); and a judge of the High Court of Justice (1879). He was the author of *Essays of a Barrister* (1862); *General View of the Criminal Law of England* (1863); *Liberty, Equality and Fraternity* (1873); *A Digest of the Law of Evidence* (1876); *A Digest of the Criminal Law* (1877); and a *History of the Criminal Law of England* (1883).— Leslie Stephen, brother of the foregoing, born at Kensington in 1832; was educated at Eton, King's College, London, and Trinity Hall, Cambridge; was graduated in 1857, and became a fellow and tutor. Subsequently devoting himself to literature, he became the editor of the *Cornhill Magazine* (1871-82), and was the author of the *Playground of Europe* (1871); *Essays on Freethinking and Plain Speaking* (1873); three series of *Hours in a Library* (1874-79); *History of English Thought in the Eighteenth Century* (1876); *The Science of Ethics* (1882); lives of Pope, Swift and Johnson in the *English Men of Letters* series; and a *Life of Henry Fawcett* (1885). Was also editor of the *Dictionary of National Biography*. He died February 22, 1904.— Henry John, a cousin of Sir James and Sir George, born in 1787, died 1864, was author of *New Commentaries on the Laws of England* (four vols., 1841-45), often republished and quoted as a standard authority.

Stephen, St. There are three saints of this name in the calendar, viz.: (1) The martyr whose death is recorded in the Acts of the Apostles, chapters vi and vii, and whose festival is held on Dec. 26; (2) Stephen, a pope from 253 to 257 (his day is the 2d of August); and (3) Stephen the king (Stephen I of Hungary), a popular saint in Hungary and South Germany.

Stephen Bathori. See *Bathori.*

Stephens, Stephi'anus (English and Latin forms of *Estienne* or *Etienne*), the name of a notable French family of printers and scholars, the founder of which was Henry Stephens, who established himself in Paris about 1502. He was succeeded by his son Robert and grandson Henry.

Stephens, Alexander H., statesman, born near Crawfordsville, Georgia, in 1812. In 1834 he was admitted to the bar; was elected to the Georgia legislature in 1836 and to Congress in 1843, where he at once assumed prominence as a fearless advocate of the Union. In 1850 he opposed the secession movement. In 1860 he opposed the secession of Georgia, but after it was declared he joined the secession cause and in 1861 was made Vice-President of the Southern Confederacy. In 1866 he delivered a strong reconstruction speech and plea for the new freedmen. From 1874 to 1882 he was a member of Congress; in the latter year was elected Governor of Georgia. He died March 4, 1883.

Stephens, Ann S., novelist, born at Derby, Connecticut, in 1813; died in 1866. She wrote many tales and novels, among them being *The Heiress of Greenhurst, The Old Homestead,* and *Fashion and Famine.*

Stephens, John Lloyd, an American author, was born at Shrewsbury, New Jersey, in 1805; and died in 1852. He was graduated in 1822 at Columbia College; studied law, and practiced for eight years at the bar in New York. To recruit his health he made an extended journey through Europe and the East, an account of which he supplied in letters to Hoffman's

American Monthly Magazine, and afterwards published in fuller narrative form under the title of *Incidents of Travel in Egypt, Arabia Petræa, and the Holy Land* (1837), and *Incidents of Travel in Greece, Turkey, Russia, and Poland* (1838). In the following year he was sent by the United States government to negotiate a treaty with the government of Central America; and as the result of his experiences and investigations in that country he published *Incidents of Travel in Central America, Chiapas, and Yucatan* (1841); and after further explorations he issued *Incidents of Travel in Yucatan* (1843), both of which were valuable contributions to our knowledge of the ruined cities and monuments of this part of America. He was afterwards chiefly associated with the company which constructed a railway across the Isthmus of Panama.

Stephenson (stē′vn-sun), GEORGE, engineer, was born at Wylam, near Newcastle, England, in 1781; and died in 1848. In his fourteenth year he became assistant to his father, who was fireman at a colliery, and in 1812 he was appointed to manage

George Stephenson.

the engine at Killingworth Colliery. Meanwhile he had been educating himself, chiefly in the science of mechanics, with the result that he obtained permission from Lord Ravensworth to construct a traveling engine for the colliery tramway. This he accomplished in 1814, and next year he introduced a great improvement in the shape of the steam blast. In 1822 he succeeded in inducing the projectors of the Stockton and Darlington Railway to adopt an improved locomotive. He was then employed to construct the Liverpool and Manchester Railway, the directors of which accepted his locomotive called the 'Rocket,' which at the trial trip in 1830 ran 29 miles in an hour. He was afterwards identified with numerous railway undertakings, and he was also the inventor of a miner's safety-lamp.—ROBERT, his son, born in 1803; died in 1859. He was educated at Newcastle; apprenticed to a coal-viewer at Killingworth, and attended the science classes in Edinburgh University. Afterwards he assisted his father in the survey of various lines; and was subsequently employed in railway undertakings both at home and abroad. His most notable engineering achievements were the construction of the high-level bridge at Newcastle-on-Tyne, the railway bridge at Berwick-on-Tweed, the tubular bridge over the Menai Straits, and the Victoria tubular bridge over the St. Lawrence in Canada.

Stepniak (step′ni-ak), the *nom-de-plume* of SERGIUS MICHAEL DRAGOMANOFF, a Russian revolutionist, born in the Ukraine in 1841. He became a professor of Kieff in 1870, but was forced to flee on account of his free utterances in 1876. He afterwards resided in Geneva and London, where he published *Underground Russia*, *Nihilism As It Is*, and other works. He was killed by a railway train in 1895.

Steppes (steps), (from the Russian *stepi*, a waste), the name applied to those extensive plains which, with the occasional occurrence of low ranges of hills, stretch from the Dnieper across the southeast of European Russia, round the shores of the Caspian and Aral Seas, between the Altai and Ural chains, and occupy a considerable part of Siberia. In spring they are covered with verdure, but for most of the year they are dry and barren.

Sterculiaceæ (ster-kū-li-ā′se-ē), a nat. order of polypetalous exogens, allied to Malvaceæ. The plants of this order are trees or shrubs, with alternate, stipulate, simple, and often toothed leaves, with a variable inflorescence. They are natives of tropical and sub-tropical regions. The most important member of the order is the cacao-tree; others are the kola tree, the baobab, the durian, and the silk-cotton tree. The species here illustrated, a native of South and Central America, yields edible seeds as large as a pigeon's egg.

Stère (stār), the French unit for solid measure, equal to a cubic meter, or 35.3156 cubic feet.

Stereobate (ster'e-u-bāt), in architecture, a kind of continuous pedestal at the bottom of a plain wall: distinguished from a *stylobate*, under a series of columns or pilasters.

Stereochemistry, that branch of chemistry which treats of the special relations of the atoms to each other. See *Isomerism.*

Stereopticon (ster-e-op'ti-kon), a lantern for throwing pictures upon a screen by means of a powerful light; called at first *magic lantern* (q. v.). As applied to moving pictures it is called the *projection machine.*

Stereoscope (ster'e-u-skōp), an optical apparatus which enables us to look at one and the same time upon two photographic pictures nearly the same, but taken under a small difference of angular view, each eye looking upon one picture only; and thus, as in ordinary visions, two images are conveyed to the brain which unite into one, the objects being thus represented under a high degree of relief. A reflecting form of stereoscope was invented by Wheatstone in 1838. Subsequently Brewster invented the refracting stereoscope, based on the refractive properties of the halves of double-convex lenses. This is the one now in general use. There are many forms of it, but it is generally a kind of small box furnished with two tubes containing each the half of a lens through which the eyes look upon the two pictures at the back of the box. When the tubes are adjusted to suit the eye the observer takes the one picture into the right eye and the other into the left eye, but the perceptive faculty apprehends only one image, and that in bold substantial relief and intensity.

Stereotype (ster'e-u-tīp). See *Printing.*

Sterility. It is necessary to understand the difference between Impotence and Sterility. *Impotence* is inability to perform the sexual act. *Sterility, on the part of the male,* means inability to impregnate the female; *sterility, on the part of the female,* means inability to produce a living child. For this last, it is necessary that the woman should function perfectly with regard to menstruation, that she should become pregnant, and that she should be able to carry the product of conception to term. There are very many possible causes for sterility, and the etiological factor may be found to lie with the man or with the woman. Frequently it is very difficult to discover the cause, particularly as it is now known that several of the ductless glands are involved in the process of the production of a live child. Formerly, when a woman did not become pregnant within two years of marriage, it was the custom to assume that something was wrong with *her*, and she was frequently subjected to a surgical operation. It was never imagined that the fault might lie with the man; whereas it is now known that approximately one-half of the cases of sterility are due (directly or indirectly) to the male. Frequently the condition is curable; frequently it is not. But both parties should be examined by an honest and competent physician, and every possible contributing factor should be taken into consideration. Occasionally it happens that no cause can be found, and that sterility only occurs between a given couple, and ceases when each of the pair finds a new partner.

Sterilized Milk (ster'il-īzd), milk which has been subjected to a process that destroys the bacteria causing lactic or butyric acid fermentation and the germs of disease. Sterilization is effected by boiling or exposing the milk to superheated steam. See also *Pasteurizer.*

Sterling, a city, county seat of Logan Co., Colorado, 128 miles N. E. of Denver. It is in a farming, stock-raising and dairying section. Sugar manufacturing is the principal industry. Pop. (1920) 6415.

Sterling, a city of Whiteside Co., Illinois, 109 miles W. of Chicago, on Rock River, at the head of the Illinois & Mississippi Canal. It has iron works and numerous manufactures of gas engines, hardware, farm implements, wire, funeral vehicles, pumps, etc. Pop. (1900) 8182; with Rock Falls, 11,109.

Sterling, an epithet by which English money of account is distinguished, signifying that it is of the fixed or standard national value; as, a pound *sterling.*

Sterling, JOHN (1806-44), a poet and essayist, born at Kames Castle, Island of Bute. He received his education at Glasgow and Cambridge universities. He published a volume of poems (1839), as also the tragedy of *Strafford* (1843), also novels, poems, and essays. He is known chiefly as the subject of Carlyle's *Life of John Sterling* (1851).

Sternberg (stern'burh), a town of Moravia, 10 miles N. N. E. of Olmütz. It has important manufactures of linen, cotton, hosiery, sugar, bricks, and liquors. Pop. 14,585.

Sternbergia (stern-ber'ji-a), a fossil plant, probably monocotyledonous, allied to the Pandanaceæ or screw-pines, occurring in sandstones.

Sterne (stern), LAURENCE, an English humorist, son of a lieutenant in the army, was born at Clonmel, Ireland, in 1713; died in London in 1768. He lived for part of his boyhood in Ireland, and afterwards being handed over to the care of a relative in Yorkshire, was put to school at Halifax in 1722, whence he removed to Jesus College, Cambridge. He took his degree of M.A. in 1740, received holy orders, and, through the interest of Dr. Jacques Sterne, his uncle, a prebendary of Durham, he obtained the living of Sutton, in Yorkshire, and also a prebend of York. Subsequently, by the interest of his wife, whom he married in 1741, he obtained the neighboring living of Stillington, at which and at Sutton he performed the clerical duties for nearly twenty years. During this period he was quite unknown as an author. In 1759 appeared the first two volumes of his longest work, *The Life and Opinions of Tristram Shandy*, which, by their humor, whimsicality, and happy audacity of tone and treatment, gained instant popularity. A third and fourth volume appeared in 1761, a fifth and sixth in 1762, a seventh and eighth in 1764, and a ninth, singly, in 1766. From the publication of the first volumes of *Tristram Shandy*, Sterne lived mostly in London or on the Continent, for a considerable time apart from his wife and daughter, who also were not with him at his death. His other writings are *A Sentimental Journey through France and Italy* (1768), and a number of sermons, besides letters published after his death. Though disfigured by indecency Sterne's *Tristram Shandy* and *Sentimental Journey*, especially the former, contain some of the finest humor in English literature.

Sternhold (stern'hold), THOMAS, one of the writers of the first metrical version of the Psalms. He was educated at Oxford, became groom of the robes to Henry VIII, and died in 1549. The principal coadjutor of Sternhold in this work was John Hopkins.

Sternum (ster'num), in anatomy, the name of the breast-bone of vertebrate animals. In man the sternum forms the front boundary of the thorax or chest in the middle line, and to it the first seven pairs of ribs are attached. It consists in the adult of three pieces, named the *manubrium*, the *gladiolus*, and the *ensiform cartilage* or *xiphoid* appendage. It has a concave surface posteriorly, gradually decreases in breadth from above downwards, and averages about 6 inches in length. See *Thorax*.

Stethoscope (steth'u-skōp), an instrument used by medical men for distinguishing sounds within the thorax and other cavities of the body. In its simplest form it consists of a hollow wooden cylinder with one extremity funnel-shaped, the other with a comparatively large circular ivory plate. In using it the funnel-shaped extremity is placed upon the body of the patient, and the ivory plate to the ear of the listener, this broad plate helping to exclude foreign sounds. See *Auscultation*.

Stettin (stet-tēn'), capital of Pomerania and the chief seaport in Prussia, situated on the Oder 17 miles from its entrance into the Stettiner Haff, 30 miles from the Baltic Sea, and about 90 miles by rail from Berlin. The principal part is built on the left bank of the river, while on the right bank are the suburbs of Lastadie and Silberwiese, connection being maintained by several bridges, one of which is a large railway swing bridge. The town has greatly expanded recently, especially since the removal of the extensive fortifications by which it was surrounded. Among its more notable features are the old royal palace, now occupied as government buildings, the new town-hall, two monumental gateways, several Gothic churches, exchange, theater, etc. Its industries, which are numerous and important, include iron-founding, shipbuilding, machine-making, the manufacture of chemicals, cement, sugar, etc. It has been a port of some importance since the twelfth century. Pop. 224,078.

Steuben (stū'ben), BARON VON, born in Prussia in 1730; acquired renown during the Seven Years' war; was made adjutant-general of the king's staff, but resigned and tendered his services to Washington in 1777, aiding greatly in drilling and organizing the army at Valley Forge. In the following year he became an American major-general, and took an active part, chiefly as organizer, in the War of Independence until its close. Then he received from Congress a pension and a large grant of land in New York. He died in 1794.

Steubenville (stū'ben-vil), a city, county seat of Jefferson Co., Ohio, on the Ohio River, 43 miles below Pittsburgh, in a district rich in bituminous coal and oil. Its industries comprise steel, iron, glass, pottery, paper, etc. It has a library and beautiful parks. Pop. (1910) 22,391; (1920) 28,508.

Stevens (stē'vens), ALFRED, artist, born at Blandford, Dorsetshire, in 1817; died in 1875. His great

work is the monument to the Duke of Wellington in St. Paul's.

Stevens, Edwin A. (1795-1868), an American capitalist, born at Hoboken, N. J. In 1870 he founded the Stevens Institute of Technology at Hoboken, whose endowment is now $1,500,000, and which in 1920 had a student enrolment of 780.

Stevens, Thaddeus, statesman, born in Danville, Vermont, April 4, 1793. He was graduated at Dartmouth College, studied law, and as a lawyer was employed in many important suits. Removing to Pennsylvania, he served several terms in the legislature, and in 1835 succeeded in having the public school system adopted in that State. He was elected to Congress in 1848 and served for many years in that body where, as one of the Republican leaders, he was the chief advocate of emancipation and representative of the radical section of his party. Though he attacked his adversaries with bitter denunciation and sarcastic taunt, he was noted for uniform acts of charity. He died in 1868.

Stevenson (stē'ven-sun), Robert, engineer, born in Glasgow, in 1772; died in 1850. When nineteen he was intrusted with the erection of a lighthouse on the island of Little Cumbrae, and constructed twenty-three lighthouses round the coasts of Scotland, the most notable of which was the Bell Rock Lighthouse. He wrote an account of the latter, and published several important articles in the *Edinburgh Encyclopædia* and the *Encyclopædia Britannica.*

Stevenson, Robert Louis Balfour, author, grandson of the preceding, was born in Edinburgh, Nov. 13, 1850. Educated as an engineer, he studied law, and afterwards made literature his profession, becoming one of the most notable of recent novelists. He first attracted attention by two charming works, *An Inland Voyage* and *Travels with a Donkey.* Following were: *New Arabian Nights, Treasure Island, Prince Otto, The Strange Case of Dr. Jekyll and Mr. Hyde, Kidnaped, The Master of Ballantrae, The Wrecker, David Balfour, A Child's Garden of Verses,* and a number of sketches, etc. In his later years he resided in the Samoan Islands, and there died, December 3, 1894.

Stevenson, Adlai E., Vice-President of the United States, was born in Christian Co., Kentucky, Oct. 23, 1835. In 1874 and 1878 he was elected a member of Congress from Illinois by the Democratic party in a strong Republican district, showing his personal popularity. In 1885 he was appointed First Assistant Postmaster-General, and in 1892 was elected Vice-President of the United States. He was defeated as Vice-President (with W. J. Bryan) in 1900. Died June 13, 1914.

Stevens Point, a city, county seat of Portage Co., Wisconsin, on the Wisconsin River, 150 miles north of Milwaukee. It has large lumbering interests and manufactures of sashes and doors, furniture, boxes, etc. Pop. (1910) 8692; (1920) 11,371.

Stewart (stö'art), Balfour, physicist, born at Edinburgh in 1828; died in 1887. He was educated at St. Andrews and Edinburgh; engaged in mercantile affairs, and went to Australia for several years; and on his return he was appointed successively assistant to Professor Forbes in Edinburgh, director of Kew Observatory, and professor of physics in Owen's College, Manchester. Among his numerous writings are: *An Elementary Treatise on Heat* (1866); *Lessons on Elementary Physics* (1870); *Conservation of Energy* (1873); *The Unseen Universe* (1875) and *The Paradoxical Philosophy* (1878), in conjunction with Professor Tait; and *Practical Physics* (1885), in conjunction with Professor Gee.

Stewart, Charles, naval officer, born at Philadelphia in 1778; died in 1869. He took part in the naval operations against Tripoli in 1804, commanded the *Constitution* in 1813, was in command of a squadron in the Mediterranean 1816-20, and in the Pacific 1821-23. He afterwards commanded the home squadron and had charge of the naval station at Philadelphia.

Stewart, Sir Donald, was born in 1824, educated at Aberdeen University, entered the Bengal Staff Corps in 1840, took part in the suppression of the Indian mutiny in 1857, and in the Abyssinian expedition of 1867-68. He commanded the Candahar column in the Afghan campaign in 1878-80, and marched with the field force from Candahar to Cabul, defeating the Afghans at Ahmed Kheyl. He was commander-in-chief in India in 1881-85, and afterwards became a member of the Indian Council. He died in 1900.

Stewart, Dugald, a Scottish philosopher, born at Edinburgh in 1753; died in 1828. He was educated in Edinburgh, and attended the lectures of Dr. Reid in Glasgow. In 1772 he began to assist his father, who was professor of mathematics in Edin-

burgh University, being appointed joint-professor three years afterwards. In 1778 he agreed to lecture also as substitute for Adam Ferguson in the chair of moral philosophy, and in 1785, when the latter resigned, Dugald Stewart received the appointment. Besides holding this position for a quarter of a century, from which he spread a fine intellectual and moral influence, Stewart was the author of *Elements of the Philosophy of the Human Mind* (1792-1827), *Outlines of Moral Philosophy* (1793), and accounts of the *Life and Writings of Adam Smith*, of *Dr. Robertson* and of *Dr. Reid.*

Stewart, FAMILY OF. See *Stuart.*

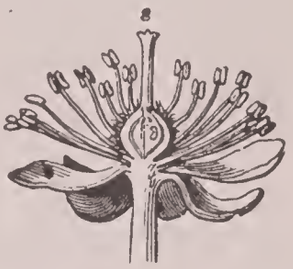
Stewing (stö'ing), a mode of cooking by which the meat is first covered with cold water, gently heated, and then kept slowly simmering below the boiling point until it is thoroughly cooked. If the stewing is not accomplished slowly the meat will be dry and tough.

Steyr (stī'er), a town of Upper Austria, at the confluence of the Steyer with the Enns, 19 miles S. E. of Linz, and about 90 miles S. W. of Vienna. It contains an old castle (10th century) and a Gothic church (1443.) Its chief industry is in iron and steel, and the making of cutlery; there is also an important small-arm factory. Pop. 17,-592.

Stibnite (stib'nīt), trisulphide of antimony, an ore consisting of 72.88 antimony and 27.12 sulphur. The color is lead-gray or blackish, and it is very brittle. This ore is the source of most of the antimony of commerce. Called also *Antimony-glance.*

Stickleback (stik'l-bak), the popular name for certain small teleostean fishes which constitute the genus *Gasterosteus.* The species are found in the ponds and streams of the United States, as well as in salt-water; they are very active and voracious, and live upon aquatic insects and worms. The sticklebacks are among the very few fishes which build nests for their young. The nest is composed of straw, sticks, etc. In the top a small hole is formed, and in this the eggs, yellow in color and about the size of poppy seeds, are deposited. The most common species is the three-spined stickleback, banstickle, or tittlebat (*G. aculeātus*, or *trachūrus*), which is distinguished by the body being protected at the sides with shield-like plates, and by the possession of three spines on the back. It varies from 2 to 3 inches in length.

Stigma (stig'ma), in botany, the upper extremity of the style, and the part which in impregnation receives the pollen. It is composed of cellular tissue, has its surface destitute of true epidermis, and is usually moist. In many plants there is only one stigma, while in others there are two, three, five, or many, the number of stigmas being determined by that of the styles.



Section of Flower. *s*, Stigma.

Stigmata (stig'ma-ta), marks said to have been supernaturally impressed upon the bodies of certain persons in imitation of the wounds on the crucified body of Christ. St. Francis of Assisi is said to have been supernaturally marked in this way, and a similar distinction was claimed for St. Catherine of Siena.

Stilbite (stil'bīt), a mineral of a shining pearly luster, of a white color, or white shaded with gray, yellow, or red. It has been associated with zeolite and called *foliated zeolite* and *radiated zeolite.*

Stilet'to, a small dagger with a round, triangular or square pointed blade from 6 to 12 inches long, introduced in the middle ages, and made of ivory, bone or metal.

Stilicho (stil'i-kō), a general under the later Roman empire, was probably the son of a Vandal captain of the barbarian auxiliaries of the Emperor Valens. His prowess and military skill made him invaluable to the Emperor Theodosius. That emperor having bequeathed the Empire of the East to his son Arcadius, and that of the West to his second son Honorius, the former was left under the care of Rufinus, and the latter under the guardianship of Stilicho. At the death of the emperor (in 394 A.D.) Rufinus stirred up an invasion of the Goths in order to procure the sole dominion, but Stilicho put this down and effected the destruction of his rival. After suppressing a revolt in Africa he marched against Alaric (403 A.D.), whom he signally defeated at Pollentia, but whose claim for a subsidy from the Roman treasury he afterwards warmly supported. This conduct excited suspicion of his treachery on the part of Honorius, who massacred all the friends of Stilicho during his absence. He received intelligence of this fact at the camp of Bologna, whence he fled to

Ravenna. There, however, he was seized and put to death, 408 A. D.

Still. See *Distillation.*

Still, Andrew Taylor (1828-1917), founder of osteopathy, born in Lee county, Virginia, educated at the log schoolhouse at Jonesboro, Va., and Holston College, Tenn. He served as a surgeon and major of the Twenty-first Kansas Volunteers in the Civil war. In 1874 he grasped the pivotal truth of osteopathy, and that year he called the birth of the science. He established his first school in 1892 at Kirksville, Mo., in a two-room frame cottage which has grown to the great American School of Osteopathy. He died December 12, 1917.

Stilling. See *Jung.*

Stillingfleet (stil'ing-flēt), Edward, a learned English divine, born in 1635; died in 1699. He studied at St. John's College, Cambridge, and was successively appointed rector of Sutton in Bedfordshire (1657), St. Andrews, Holbron (1665), canon of St. Paul's (1670), archdeacon of London (1677), the following year dean of St. Paul's, and bishop of Worcester (1689). His writings, most of which are controversial, and combat the views of Roman Catholics, Nonconformists, etc., include *Irenicum, a Weapon-salve for the Church's Wounds* (1659), *Origines Sacræ, or a Rational Account of the Christian Faith* (1662), etc.

Stillwater (stil'wą-ter), a city, capital of Washington Co., Minnesota, on the St. Croix river, 18 miles N. E. of St. Paul. It was formerly the center of a great lumber trade, but its chief industries now are foundries, machine shops, flour, boot and shoe, and wood-working factories, etc. Pop. 7735.

Stillingia (stil'in-ji-a), a genus of plants, nat. order Euphorbiaceæ, one of the species being the famous tallow-tree of China (*S. sebifera*). See *Tallow-tree.*

Still Life, in painting, the representation of inanimate objects, such as dead animals (game, fishes, etc.), furniture, vases, sometimes with fruits and flowers in addition.

Stillman, (stil'man), James (1850-1918), an American banker, born at Brownsville, Texas, educated at Ossining, N. Y. He was president of the National City Bank of New York from 1891 to 1909, during which time he raised the bank's surplus from $2,452,000 to $29,038,000. He was the banker for the great Standard Oil Company and was the force behind the construction of many railroads and industries, being at one time director of no fewer than 54 large corporations. He believed in foreign expansion and set himself to make America a commercial leader among nations, with New York the financial center of the world. He was an ardent yachtsman and was vice-commodore of the New York Yacht Club. He died March 15, 1918.

Stillman, Thomas Bliss (1852-1915), an American chemist, born at Plainfield, N. J., graduated from Rutgers College in 1873. He was author of *Engineering Chemistry* and *Examination of Lubricating Oils.*

Stillman William James, author and artist, was born at Schenectady, New York, in 1828; died July 5, 1901. He wrote *The Cretan Insurrection, On the Track of Ulysses, Apollo and Venus,* etc. He was editor of the *Crayon* 1856-57.

Stilt-bird, Stilt-plover, a wading bird, having remarkably long slender legs, a feature from which it derives its common name. The stilt-bird of Great Britain is the *Himantopus melanoptĕrus.* The black-necked stilt, *H. nigricollis,* is found in the United States. Few birds exceed it in the powers of flight, it traveling with astonishing rapidity.

Stilted Arch, a term applied to a form of the arch which does not spring immediately from the imposts, but from a vertical piece of masonry resting on them so as to give to the arch an appearance of being on stilts. Arches of this kind occur frequently in all the mediæval styles.

Stilton Cheese, a well-known and highly esteemed solid, rich, white cheese, originally made at *Stilton,* Huntingdonshire, England, but now chiefly made in Leicestershire.

Stimson (stim'sun), Henry Lewis, born at New York in 1867; was graduated at Harvard in 1888. He entered the law office of Senator Root, was appointed district attorney for the southern district of New York State, and distinguished himself by his successful prosecution of the Sugar Trust frauds. He also tried and convicted Charles W. Morse for misapplying bank funds. He was nominated for Governor of New York in 1910, but lost the election. In 1911 he succeeded Jacob M. Dickinson as Secretary of War in Taft's cabinet.

Stimulants (stim'ū-lants), in medicine, agents which produce a quickly diffused and transient increase of vital energy in the organism or some part of it. Stimulants are of two classes: the one comprises certain medici-

nal substances; the other warmth, cold, electricity, galvanism, and mental agents such as music, joy, hope, etc. In the first class ammonia, alcohol and sulphuric ether are commonly employed as stimulants. Stimulants have also been divided into *general* and *topical*, according as they affect the whole system or a particular part.

Sting, a sharp-pointed weapon or instrument with which certain insects, bees and wasps in particular, are armed by nature for their defense. In most instances this instrument is a tube, through which a poisonous matter is discharged, which inflames the flesh, and in occasional instances proves fatal to life.

Sting-ray, a fish belonging to the genus *Trygon*, nat. order Elasmobranchii, family Trygonidæ, which is allied to that of the rays proper. It is remarkable for its long, flexible, whip-like tail, which is armed with a projecting bony spine, very sharp at the point, and furnished along both edges with sharp cutting teeth. A species (*Trygon centrura*) is common on the eastern coasts of N. America. These fishes sometimes inflict serious wounds with their tail.

Stink-ball, a preparation of pitch, rosin, niter, gunpowder, colophony, asafœtida, and other offensive and suffocating ingredients, placed in earthen jars, formerly used for throwing on to an enemy's decks at close quarters, and still in use with Eastern pirates.

Stint (*Tringa*), a grallatoral bird, a species of sandpiper. Temminck's stint (*Tringa Temminckii*) is the smallest species of the British sandpipers, length 5½ inches. It inhabits the edges of lakes and inland rivers, and is said to breed in North Europe.

Stipe (stīp), in botany, the foot-stalk of the fronds of ferns, as also the stem which carries the pileus of such fungi as agarics.

Stipple (stip'l), in engraving, a mode of producing the desired effect by means of dots; also called the *dotted style*, in contradistinction to *engraving in lines*. See *Engraving*.

Stipule (stip'ūl), in botany, a small leaf-like appendage to a leaf, commonly situated at the base of the petiole in pairs, one on each side, and either adhering to it or standing separate. They are usually of a more delicate texture than the leaf, but vary in this respect as well as in form and color. They are not found in all plants, but where they occur they frequently characterize a whole family, as in Leguminosæ, Rosaceæ, Malvaceæ, etc.

Leaf with Stipules, *s s*.

Stirling (stur'ling), a royal and parliamentary burgh of Scotland, capital of the county of the same name, situated on a height overlooking the winding course of the river Forth, and 36 miles N. W. from Edinburgh. The town consists of an ancient portion formed of steep winding streets, and a modern portion built on the lower ground. The most important edifice is the castle, on a rocky eminence, which rises 220 feet above the plain, and terminates precipitously on the north-west side of the town. The principal parts of it as they now stand are the royal palace (rebuilt after a fire in 1855); the Parliament House, once a noble fabric, but now converted into mess-rooms and other accommodations; the chapel-royal, now used as store-rooms; and another palace begun by James IV, and finished by his granddaughter Mary. Other objects deserving of notice are the old church, with a massive and lofty tower; the North Parish Church; two old buildings called Mar's Work and Argyle's Lodgings; a fine arcade with town-hall; the Smith Institute, with library, reading-room, museum and picture-gallery; a new public hall, etc. The principal manufactures are woolens, carpets, leather, ropes, carriages; and there is a small shipping trade. Pop. (1921) 21,345.

The COUNTY of Stirling, area 451 sq. miles, lies between the firths of Clyde and Forth. In the N. W. corner is Ben Lomond, a mountain over 3000 feet high. The chief river is the Forth. The coal-fields of the southeastern part of the county are extensive, iron is largely mined, and limestone is wrought in the Campsie district. There are important manufactures of woolens, cottons, and iron, besides a number of breweries and distilleries. Pop. 161,726.

Stirling, JAMES HUTCHISON, born in Glasgow in 1820; educated in arts and medicine in Glasgow University, France, and Germany; practiced as a surgeon in Wales for some years, but ultimately devoted himself to literary and philosophical studies. He is the author of *The Secret of Hegel* (1865); *Sir Wm. Hamilton, being the Philosophy of Perception* (1865); *Jerrold, Tennyson, Macaulay, and other Essays* (1868); *As regards Protoplasm* (1869); *The Philosophy of Law* (1873); *Burns*

in Drama, together with Sacred Leaves (1878); *Text-Book to Kant* (1881); *The Community of Property* (1885), etc.; and translator of Schwegler's *Hand-book of the History of Philosophy*. He was Gifford lecturer at the University of Edinburgh, 1888-90. Died in 1909.

Stirrup (stir'up), a strap or something similar hanging from a saddle, and having at its lower end a suitable appliance for receiving the foot of the rider, used to assist persons in mounting a horse, and to enable them to sit steadily in riding. Ancient writers make no mention of stirrups, and they are first known to have been used in Europe in the sixth century A.D. They were in use among the Anglo-Saxons, and by the twelfth century they were common.

Stiver (stī'ver), an old Dutch coin and money of account worth about two cents in money of the United States.

St. Mary's, a borough in Elk Co., Pennsylvania, 10 miles E. of Ridgway. It has breweries, saw and grist mills, and other industries. Pop. 6346.

Stoat. See *Ermine.*

Stock (stok), a name originally applied to a cruciferous garden plant, *Matthĭola, incāna* (called more fully *stock-gillyflower*), but now extended to the various species of *Matthĭola*, and to certain allied plants of the same order. They are herbaceous or shrubby, biennial or sometimes perennial, and have single or double fragrant flowers, varying in color from white to red. The pods are nearly cylindrical, stigmas, large and spreading, and seeds winged. *M. incāna* is probably the parent of the greater number of the hoary-leaved varieties cultivated, and known as Brompton stock, queen stock, etc. The Mahon stock (*Malcolmia maritima*) has been introduced from the Mediterranean, and like the species already mentioned is a favorite annual in the flower-garden on account of its beauty and fragrance.

Stock, in law, the term used to denote either the nominal capital invested in an incorporated company, usually called the capital stock, or the interests of the subscribers in the corporation. The capital stock is divided into shares which are distributed among the stockholders; and the par value of each share is determined by dividing the capital stock by the total number of shares issued. The stockholder is entitled to a share of the profits, and a voice in the management of the corporation. Dividends are paid on *common stock* whenever in the judgment of the directors there is a sufficient surplus to warrant it; but the rate of percentage of dividends which shall be paid on *preferred stock* is usually fixed in the certificate of incorporation or the by-laws, and cannot exceed that rate, though it may be less if the earnings are not sufficient to pay it in full.

Treasury stock is that retained by the corporation and not issued to subscribers; *watered stock* is that for which the corporation has not received full value, and is usually issued for property estimated at a fictitious value. Laws governing the issue, ownership and control of stock vary in the several states.

Stockade (sto-kād'), in fortification, a fence or barrier constructed by planting upright in the ground trunks of trees or rough piles of timber so as to include an area which is to be defended.

Stock Exchange, an organization of professional brokers which conducts speculation and investment in securities, the paper representatives of transportation, industrial, mining, commercial and other properties. The leading stock exchanges of the United States are located in the cities of New York, Boston, Pittsburgh, Philadelphia, Chicago, Baltimore, Cleveland, Cincinnati, New Orleans, Salt Lake City, Denver, San Francisco, St. Louis. The principal exchanges in other countries are those of London, Paris, Berlin, Amsterdam, Antwerp, Brussels, Vienna and St. Petersburg.

On the American stock exchanges the brokers are all of one class—that is, they are not divided into jobbers and brokers proper; but one broker may specialize in the shares of Union Pacific, another in those of the Steel Corporation, and so on. Some brokers deal particularly in 'odd lots'—blocks of less than 100 shares—and some members called 'room traders' speculate entirely for their own account and do no commission business for customers. The commission charged for buying or selling is 12½ cents a share, so that on the usual order of 100 shares, the broker receives $12.50. The government of the exchange in New York is vested in a body called the Governing Committee, consisting of the president, treasurer and forty other members, of whom one-quarter are renewed each year. The government of the other American exchanges is similar in form.

The business of buying and selling shares is done in a large room known as the 'floor.' Scattered over the floor are a large number of high posts. Each post bears the name of the stock or stocks which may be traded in at that post

This provision is to bring buyers and sellers in any security together as quickly as possible. A broker desiring to buy shares of a certain stock will go to the post allotted to that stock and call out its name with the number of shares wished and the price he will pay. This is his bid. Other brokers may offer the stock to him at a slightly higher price, or his bid may be accepted at once. As soon as a price is agreed on, each broker—the buyer and the seller—makes a memorandum of the transaction which is reported to the offices at once by telephone. Meanwhile the broker also hands another memorandum of the transaction to an errand boy who takes the memorandum at once to the telegraph operator, who in turn sends it out on to the little instrument called the 'ticker.'

Transactions on the New York Stock Exchange may be made in three different ways: cash, regular or on a limited option to buyer and seller as to the time of delivery or acceptance. Cash means that stock bought in this manner is taken up and paid for the same day. Regular transactions mean that the stock bought in this way must be taken up and paid for by a quarter past two o'clock of the following day.

Connected with the stock exchanges of America are found clearing houses for shares. All the stocks in which there is a wide and active market are cleared. The object of this is to make as many offsets as possible, without actual deliveries, between sales and purchases. After the close of the exchange at three o'clock, comparison slips are at once exchanged between the two parties to each and every transaction, so that any misunderstanding may be at once noted. All these comparisons must be made by a quarter past four, and all firms should have their statements ready for the clearing house before seven o'clock. These statements are in the form of a balance sheet giving a record of the sales and purchases made by the firm.

One of the important differences between the New York Stock Exchange and the European bourses lies in the great variations in prices which occur in the former within short periods of time without any change in the value of the property represented by the stock. It was formerly the custom to attribute this difference to the system of marginal speculation which obtains in America, but now there seems to be no doubt but that the relations between speculation and bank loans are the real cause. Owing to the daily clearings of stock, it is customary to make bank loans on shares on call. In other words, whereas European call, or day-to-day, loans are made chiefly on commercial discounts and acceptances, American call loans are made almost invariably on bonds and stock as collateral. This brings into the closest relations the American money market and the stock exchange. Moreover these call loans are usually based on the exchange price of the stock on the day when the loan is made, regardless of the correspondence or non-correspondence of this price with the book value of the shares as shown by an appraisement of the property, condition of the company's finances, etc. It is the general custom to make call loans up to 80 per cent. of the selling price of the stock on the exchange if the stock be a dividend payer. In this way it results that, aside from higher interest charges, not very much more margin is required from a group of speculators when buying at a low figure than when buying at a high, and in either case the burden of the purchase is borne by the banks which lend on the shares, either directly to the speculators, or indirectly to them through their brokers. This feature makes immense speculative commitments on the exchange possible, with their accompaniment of inflated prices.

The same condition accounts at times for very great falls in prices. When calling of loans becomes imperative with the banks, speculators unable to pay off their loans have to see their shares thrown on the market. Such sales depress prices, weaken other loans (whose validity is judged by their correspondence with exchange prices) and induce further calls and more selling. Under this recurrent process prices may fall very low, particularly if other disturbing features, as in 1903 and 1907, are also present. Upon the outbreak of the European war, panic ensued among holders of securities, and the stock exchanges of the world were closed to prevent the selling of stocks and bonds at prices which would have brought ruin to banks and other financial houses. Practically none of them were opened until December, 1914, and then only under severe restrictions.

Stockholm (stok'hōlm), the capital of Sweden, is beautifully and picturesquely situated between Lake Mälar and the Baltic, not far south of the junction of the Baltic Sea with the Gulf of Bothnia. It stands partly on the north and south sides of the strait that communicates between the lake and the sea, and partly on several islands, which are connected with the mainland and with each other by a number of bridges. The harbor approaches are rendered dangerous by reefs, but the harbor itself is commodious, with good wharfage facilities. The oldest and densest part of the city is called

the Staden, or the 'city.' Norrmalm on the north (with its eastern and western extensions of Ladugardsgardet and Kungsholmen), Södermalm on the south, and the island of Djurgarden on the east, are important suburban extensions of the city proper. The chief public building is the Royal Palace, a fine edifice in the Italian style, situated in the Staden; other noteworthy edifices are the old Church of St. Nicholas (1264), the Franciscan Church, in which all the later sovereigns of Sweden have been buried, the Riddarhus (house of the nobility), the Royal Library, National Museum, Academy of Sciences, Parliament House, etc. The educational institutions are varied and of high excellence. The environment of the city with its numerous water-ways and bridges is suggestive of Venice, and its picturesque islands have been made beautiful by many promenades and parks, the most beautiful of which is the Djurgarden. It is besides a place of considerable trade, and has varied manufactures, important iron, steel and shipbuilding industries. Pop. (1911) 341,986.

Stocking, a close-fitting covering for the foot and leg, anciently made of cloth or milled stuff sewed together, but now knitted by the hand or woven in a frame, the material being wool, cotton, or silk.

Stock-jobbing, the practice of dealing in stocks or shares, especially by persons who buy and sell on the Stock Exchange on their own account and not for clients, as do the stockbrokers properly so-called. The transactions carried out are often entirely of a gambling nature, and the jobber may have stock of his own neither to buy nor to sell. This business is now carried on to an amazing extent, and is of this character:—A agrees to sell B $50,000 of bank stock at 120 per cent., to be transferred in twenty days, for $60,000. Now, if the price of bank stock on the day appointed for transfer should be only 118 per cent., he may then purchase as much as will enable him to fulfill his bargain for $59,000 and thereby gain $1000 by the transaction. Should the price of bank stock, however, advance to 125 per cent., he will have to pay $62,500 for the necessary amount of stock and will thus lose $2500 by completing his agreement. In New York, Philadelphia and other American Stock Exchanges the delivery of the stock is required; in London, where 'time contracts' prevail, the stock is not usually transferred. See *Bulls and Bears.*

Stock-list, a list published daily or periodically in connection with a stock-exchange, enumerating the leading stocks dealt in, the prices current, the actual transactions, etc.

Stockmar (shtok'mar), Christian Friedrich, Baron Von, German diplomat and physician, was born in Coburg, 1787; died, 1863. He was appointed (1816) physician to Prince Leopold of Coburg, subsequently holding the positions of his secretary, keeper of the privy purse, and controller of the household. He also took part in the negotiations which led to Leopold's marriage with the Princess Charlotte, and to the elevation of Leopold to the throne of Belgium (1831), and was one of those who arranged the marriage of Queen Victoria to Prince Albert (1840).

Stockport (stok'port), a parliamentary and municipal borough of England, partly in Cheshire and partly in Lancashire, 5 miles southeast of Manchester, on the Mersey. Its chief structures are St. Mary's Church, Christ Church, the free grammar school, the Sunday school, the free library, the museum situated in Vernon Park, and the immense railway viaduct which here crosses the Mersey. The cotton trade, connected with which are spinning, weaving, dyeing, etc., is the staple, and there are also foundries, machine shops, breweries, etc. Pop. 108,693.

Stock Raising, the rearing of cattle, horses, mules, sheep, goats and swine for market, forms one of the great industries of the United States, but while this country leads the world in the value of its live stock ($8,566,313,000 in 1920), several other countries are important rivals. The Argentine Republic, with the same favorable conditions of climate and pasturage, and with a less densely populated area, is rapidly increasing its exports of cattle and sheep products. Australia leads the world in the wool-raising industry. Statistics in the United States show that the dairy industry is increasing in importance while the business of raising cattle is declining. The value of milch cows in 1920 was $2,021,681,000; cattle other than milch cows, $1,914,575,000.

Stocks (stoks), an apparatus formerly used for the punishment of petty offenders, as vagrants, trespassers, and the like. It usually consisted of a frame of timber with holes in which the ankles, and sometimes both the ankles and wrists, of the offenders were confined.

Stockton, a city, county seat of San Joaquin Co., California, on an arm of the San Joaquin River, at the head of navigation, 78 miles E. of San Francisco, with steamer connection. It

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THE UNION STOCK YARDS, CHICAGO

Cattle for all the great packing companies located in Chicago come to these yards, which hold many thousand head.

has large trade in wheat, peaches, grapes, etc., and has manufactures of farm implements, pumps, leather, lumber, flour, tractors, soap, etc. Pop. (1910) 23,253; (1920) 40,296.

Stockton (STOCKTON-UPON-TEES), a parliamentary and municipal borough and seaport, England, county of Durham, on the left bank of the Tees. It is well built, and has a town house, borough hall, custom house, many fine churches and chapels, etc. Its proximity to the Cleveland district has led to the erection of extensive iron-works, foundries, and works for the manufacture of marine engines, iron bridges, etc., and it has iron shipbuilding yards, potteries, bottle-works, etc. Pop. 69,685.

Stockton, FRANCIS RICHARD, an American author, born at Philadelphia in 1834; was an engraver and draughtsman, but abandoned this occupation for journalism. He attained much popularity by his short stories, which are very numerous, among the best known being the *Rudder Grange* stories, *The Lady or the Tiger?* The *Ting-a-ling* stories, etc. He also wrote several novels, including *The Squirrel Inn*, *Pomona's Travels*, and various others of a humorous and often grotesque character. He died April 22, 1902.

Stockwell (stok'wel), CHESTER TWITCHELL, was born at Royalston, Massachusetts, in 1841, studied medicine and dentistry, and wrote *The Evolution of Immortality*, *The Ethical Basis of Equality*, *The New Materialism*, *The New Pantheism*, etc.

Stoddard (stod'ard), CHARLES WARREN, born at Rochester, New York, in 1848, removed to California, and in 1864 to Hawaii, where much of his later life was spent. He was professor of English literature at Nôtre Dame University, 1885-87, and at the Catholic University of America after 1889. His principal books are *Poems* (1867), *South Sea Idyls* (1873), and *Mashallah: a Flight into Egypt* (1881). He died April 24, 1909.

Stoddard, FRANCIS HOVEY, author, born at Middlebury, Vermont, in 1847. He was graduated from Amherst and became professor of English literature at the University of the City of New York. He wrote *The Modern Novel*, *Conditions of Labor in England*, *Miracle Plays and Mysteries*, *The Uses of Rhetoric*, etc.

Stoddard, RICHARD HENRY, poet, was born at Hingham, Massachusetts, in 1825; learned the trade of an iron-molder; began in 1848 to write in prose and verse for periodicals, and ultimately devoted himself to literature. Among his numerous writings are *Footprints* (1849); *Poems* (1852); *Songs of Summer* (1857); *The King's Bell* (1863); *The Book of the East, and other Poems* (1871); and *Memoir of E. A. Poe* (1875). He died May 12, 1903; his wife, ELIZABETH DREW STODDARD (1873-1902), wrote several popular novels. *The Morgesons*, *Two Men*, and *Temple House*.

Stoics (stō'iks), a sect of philosophers which flourished first in Greece and subsequently in Rome, so-called from the porch or *Stoa*, at Athens, where Zeno, its founder, taught. It was about B.C. 308, fourteen years after the death of Aristotle and thirty-nine years after the death of Plato, that Zeno laid the foundation of the new school. He lived to a great age, and was held in much esteem by the Athenians, but none of his works have been preserved. His two most eminent disciples were Cleanthes and Chrysippus, who developed and systematized the Stoic doctrines. These were carried to Rome by Panætius of Rhodes, whose disciple, Posidonius, was the instructor of Cicero. Cato of Utica and Brutus also embraced Stoicism, and its chief teachers among the Romans were Cicero, Seneca, Epictetus, and Marcus Aurelius. The Stoics are proverbially known for the austerity of their ethical doctrines, which, indeed, quite overshadowed all the rest of their philosophy. With Zeno and his disciples the system appears to have been an attempt to reconcile a theological pantheism and a materialist psychology with a logic which seeks the foundations of knowledge in the representations or perceptions of the senses, and a morality which claims as its first principle the absolute freedom of the human will. Transferred to the Roman world, this philosophy became a practical rule of life. To Epictetus and the Stoics of the later empire the supreme end of life, or the highest good, is virtue, that is, a life conformed to nature, the agreement of human conduct with the all-controlling law of nature, or of the human with the divine will; not contemplation, but action, is the supreme problem for man; virtue is sufficient for happiness, but happiness or pleasure should never be made the end of human endeavor. The great struggle of Stoical morality is to subdue all emotion, which in itself is contrary to nature, entirely without utility, and productive only of evil. The wise man alone attains to the complete performance of his duty; he is without pas-

sion, although not without feeling; he is not indulgent, but just toward himself and others; he alone is free, having entirely subdued his passions, which are the great barrier to liberty; he is king and lord, and is inferior in inner worth to no other rational being, not even to Zeus himself.

Stokes, Sir George Gabriel, scientist, born in Sligo, Ireland, in 1819; was educated at Bristol and at Cambridge, taking his degree in 1841 as senior wrangler and first Smith's prizeman. In 1849 he was appointed Lucasian professor of mathematics at Cambridge. He became a member of the Royal Society in 1851, was awarded the Rumford medal for his investigations on light, and was president of the Royal Society from 1885 till 1888. His writings were mostly contributed to the transactions of the learned societies. In 1889 he was created a baronet. He died in 1903.

Stoke-upon-Trent, a market town and parliamentary borough of England, in Staffordshire, on the Trent and Mersey Canal, 14 miles northwest of Stafford. It has recently been greatly improved, and has now a town hall, free library and museum, new market hall, etc. Its extensive manufactures of china and earthenware make it the center of the 'Potteries' district. Pop. 234,553.

Roman matron attired in the Stola.

Stola (stō'la), a garment worn by the Roman women over the tunic. It came as low as the ankles or feet, was fastened round the body by a girdle, leaving broad folds above the breast, and had a flounce sewed to the bottom. It was the characteristic dress of the Roman matrons, as the toga was of the men.

Stolberg (stōl'burg), a town in Rhenish Prussia, on the Vicht, 7 miles east of Aix-la-Chapelle. Mining for coal, iron, lead, zinc, etc., is extensively carried on in the neighborhood, and there are smelting works, iron-foundries, rolling-mills, etc. Pop. 14,963.

Stolberg, Christian, Count von, a German author, born at Hamburg in 1748; died in 1821. He traveled through Switzerland and North Italy in company with Goethe and Lavater; settled in Schleswig, and wrote poems, dramas, etc., besides a translation of Sophocles and other works from the Greek. He was much influenced by Klopstock.—His brother, Friedrich Leopold, Count von Stolberg, born in 1750; died in 1819, wrote plays, poems, travels, etc.; translated the *Iliad*, four tragedies of Æschylus, some of the works of Plato, and Ossian's works. In 1800 he joined the Roman Catholic Church, after which he wrote an elaborate *History of the Religion of Jesus Christ.*

Stole (stōl), a long narrow band or scarf with fringed ends, worn by ecclesiastics of the Roman and English churches, by deacons over the left shoulder, being fastened under the right arm; by bishops round the neck, with both ends pendent in front to the knees; and by priests similarly, but with the ends crossed over the breast at mass.—*Groom of the stole*, the first lord of the bedchamber in the household of the English kings.

Stolp (stōlp), a town in Pomerania, Prussia, on the Stolpe, about 10 miles from the Baltic Sea. It has a large church built in the fourteenth century, an ancient castle, and manufactures of linen, articles in amber, spirits, tobacco, etc. Pop. 31,154.

Stolypin (stō'li-pin), Peter Abkazdievitch, premier of Russia, was born in 1863; was graduated from University of St. Petersburg in 1884. A brilliant student, he soon won a position in the cabinet, in the ministries of the Interior and of Agriculture. In 1902 he became president of the Arbitration Board and governor of Grodno, and in 1903 governor of Saratoff. Thence he returned to the ministry of the Interior, and in 1906, on the formation of the first duma, was made Prime Minister. In August of that year a bomb was exploded in his house by enemies of his administration, but did not seriously injure him, though 30 persons were killed. He continued in power during the succeeding dumas, acting in the interest of the Imperial Government, and making new enemies by his severity. On September 11, 1911, he was shot while at the theater, and died a few days later.

Stomach (stum'ak), The, the principal organ of digestion in animals, may be regarded simply as an expanded portion of the alimentary canal. The human stomach is of an irregularly conical or pear-shaped form; it is situated in the epigastric region, lying al-

most transversely across the upper and left portion of the abdominal cavity, below the liver and diaphram and close to the front wall of the abdomen. Its largest extremity is directed to the left, its smaller to the right. Its upper opening, where the œsophagus terminates, is called the *cardiac* orifice, because of its closeness to the heart; and the lower opening, where the intestine begins, the *pylōrus*, the portion of the intestine which joins it here being the duodenum. At the entrance to the latter is a valve which prevents the contents of the intestine from regurgitating backwards. The stomach is composed of four coats or layers, the outermost, or serous layer, forming part of the peritoneum or general lining membrane of the abdomen. Next is a muscular coat, then an intermediate or cellular, and lastly, an inner or mucous coat in which are the orifices of the glands for the secretion of the gastric juice. By its blood-vessels the stomach is intimately connected with the liver and spleen. Its nerves are very numerous, and come from the eighth pair and the sympathetic nerve. By these it is brought into close relationship with the heart, lungs, etc. The stomach owes its digestive powers chiefly to the gastric juice, an acid liquid containing a fermentive principle called pepsin, that converts albuminous foods into peptones capable of absorption. Digestion is also aided by certain stomachic movements by which the gastric juice is mixed with the food. (See *Digestion.*) The stomach is subject to various diseases. *Acute gastric catarrh*, in which the mucous membrane becomes congested, may be constitutional; but more probably it arises from errors of diet, excess of alcohol, sudden changes of temperature, etc. *In chronic gastric catarrh* the congestion becomes permanent, and the symptoms are such as appear in an aggravated form of dyspepsia. *Ulceration of the stomach* is a disease of middle life, and seems to occur most commonly among women. The ulcer is at first limited to the inner coat of the stomach, but if not healed it will strike more deeply and probably penetrate the walls of the stomach. In a case where the stomach adheres, at the seat of the ulcer, to some other organ, actual perforation may be prevented; in which case peritonitis, which is speedily fatal, is not likely to arise. The symptoms of this disease are chiefly pain, vomiting, especially vomiting of blood, and general dyspeptic symptoms. *Cancer of the stomach* is not uncommon, though it seldom occurs before the age of forty. Its symptoms are not easily to be decided even by a skillful physician. In mammals there are three kinds of stomachs, *simple*, *complex*, and *compound.* In the *simple* it consists of a single cavity, as in man and the Carnivora, etc. This is the most common form. The *complex* has two or more compartments communicating with each other, with no marked difference of structure, as in the kangaroo, squirrel, porcupine, etc. The Cetacea have from five to seven such compartments. The *compound* stomach is peculiar to the ruminants (which see). In animals of the lowest type there is no distinct stomach cavity at all; and even in those more highly organized it is often extremely simple.

Stomach-pump, a small pump or syringe used in medical practice, for the purpose of emptying the stomach and introducing cleansing or other liquids. It resembles the common syringe, except that it has two apertures near the end, instead of one, in which the valves open different ways, so as to constitute a *sucking* and a *forcing* passage. When the object is to extract from the stomach, the pump is worked while its sucking orifice is in connection with a flexible tube passed into the stomach; and the extracted matter escapes by the forcing orifice. When it is desired, on the contrary, to throw cleansing water, or other liquid into the stomach, the tube is connected with the forcing orifice, by which the action of the pump is reversed.

Stomach-staggers, a disease in horses, depending on a paralytic affection of the stomach. In this disease the animal dozes in the stable and rests his head in the manger; he then wakes up and falls to eating, which he continues to do till the stomach swells to an enormous extent, and the animal at last dies of apoplexy or his stomach bursts.

Stomapoda (sto-map'ō-da), an order of crustaceans, having six or eight pairs of legs, mostly near the mouth (hence the name). They are found chiefly in intertropical climates, and are almost without exception marine. The order includes the locust shrimps (*Squilla*), the glass shrimps (*Erichthys*), and the opossum shrimps (*Mysis*).

Stomata (stō'ma-ta), in botany, minute orifices or pores in the epidermis of leaves, etc., which open directly into the air cavities pervading the parenchyma, and through which exhalation takes place. In zoölogy the name is given to the breathing-holes of insects

or similar animals. They are situated along the sides of the body in insects.

Stone (stōn), a town of England, county of Stafford, on the Trent, 7 miles south of Stoke-upon-Trent. It manufactures earthenware, shoes, etc. Pop. 5690.

Stone, a hard concretion of some species of earth, as lime, silex, clay, and the like; also, the material obtained by quarrying rocks. The principal component parts of stones are silex, alumina, zirconia, glucina, lime, and magnesia; sometimes the oxides of iron, manganese, nickel, chromium, and copper are also found to enter into their composition. Stones are of various degrees of hardness and weight; they are brittle and fusible, but not malleable, ductile, or soluble in water. Stones are of extensive use for a great variety of purposes — for building, paving, grinding, ornamental purposes, etc. The stones of public buildings are liable to decay from chemical decomposition and mechanical disintegration. To prevent this decay oils and cements have been frequently used, but they have been found to discolor the stone and require frequent renewal. A siliceous coating applied to the stone seems to be the most effectual remedy. Frederick Ransome has patented a process in which a solution of silicate of soda is first put upon the stone and afterwards a solution of chloride of calcium. This process has been received with considerable favor.

Stone, a common measure of weight. The English imperial standard stone is 14 lbs. avoirdupois, but other values are in regular use, varying with the article weighed; thus, the stone of butcher's meat or fish is 8 lbs., of cheese 16 lbs., of hemp 32 lbs., of glass 5 lbs.

Stone, or CALCULUS. See *Calculus.*

Stone Age, an ancient period in the history of mankind in which only stone, bone and wood implements were known and used. It is divided into two sub-periods, the Paleolithic, or age of chipped stone, and the Neolithic, or age of polished stone implements. It far antedated historical times, though it still persists among some savage tribes.

Stone, ARTIFICIAL, a concreted material applied to numerous purposes, as making building blocks, flagstones, tiles, statuary, vases, grindstones, sewer-pipes, etc. There are many varieties, most of which have a base of hydraulic mortar, with which sand and pulverized stone of different kinds are mixed.

Stone, FRANK, an English genre painter, born at Manchester in 1800; died at London in 1859. He painted at first in water-colors, and was for long a member of the old Water-color Society. His first important work in oil, *The Legend of Montrose*, was exhibited at the Academy in 1840. Among his subsequent works are: *The First Appeal, The Last Appeal, Mated, The Course of True Love*, and *The Gardener's Daughter.* Most of his works have been engraved. He was elected A.R.A. in 1851.

Stone, LUCY (BLACKWELL), an American reformer, born in West Brookfield, Massachusetts, in 1818; was graduated from Oberlin College in 1847. In 1855 she married Dr. Henry B. Blackwell, retaining her own name. She expressed her views of woman suffrage in *Taxation without Representation.* In 1869 she helped organize the American Woman's Suffrage Association; became connected with the *Woman's Journal* in 1872, and was its editor after 1888. Her lectures on woman suffrage made her widely known. She died in Boston, October 18, 1893.

Stone, MARCUS, a painter of historical genre, the son of Frank Stone, was born in London in 1840; learned his art in his father's studio; exhibited his first picture in 1858 in the Academy, of which he became an associate in 1877, being elected an academician in 1887.

Stone, WILLIAM JOEL (1848-1918), an American lawyer and statesman, born in Madison county, Kentucky. He was educated at the University of Missouri and practiced law at Jefferson City, Mo. From 1885 to 1891 he was Democratic Congressman, and was governor of Missouri from 1893 to 1899. He was elected United States Senator in 1902 and re-elected in 1908 and 1914. Although chairman of the Senate Foreign Relations Committee he differed from President Wilson in the latter's pre-war policy and held to the belief that Americans should be warned not to take passage on armed belligerent vessels. He was one of those who voted against the war resolution in the Senate, but afterwards took his place with the supporters of war measures.

Stone-fly (*Perla bicaudāta*), a well-known species of neuropterous insects, much used by anglers as a bait in trout-fishing. The hinder wings are large, the abdomen is furnished with two long appendages, and the larger jaws or mandibles are rudimentary.

Stoneham (stōn'am), a town of Middlesex Co., Massachusetts,

8 miles N. of Boston. It is largely a residential place; has large shoe factories; also produces druggists' supplies, chemicals, etc. Pop. (1920) 7873.

Stonehenge (stōn'henj), an extensive group of standing stones in Salisbury Plain, Wiltshire, England, about 7 miles N. of Salisbury. They form two circles and two ovals. The outer circle, which is about 300 feet in circumference, consisted, when entire, of sixty stones, each being about 15 feet high and 7 feet broad. Of these thirty were uprights, and thirty imposts, the uprights being placed at intervals of 3½ feet, and the imposts fitting by means of tenon and mortice. Of the outer circle twenty-four uprights remain (seventeen standing and seven down) and eight imposts, and at the grand entrance there are eleven uprights remaining, with five imposts. The inner circle, which is 8 feet from the outer, consisted of about thirty stones, 6 feet in height, without imposts; nineteen remain, eleven standing. The first oval consists of five trilithons, as they are called, that is, groups of three stones, two uprights, with an impost. Before each trilithon stood three smaller upright stones, but there are only six now standing. Inside the inner oval is a large slab supposed to have been an altar. The whole is surrounded by a double mound and ditch, and there is also an avenue leading from the northeast, bounded by a mound and ditch. In the neighborhood is a flat tract of land called the Cursus, and in the surrounding plain are numerous tumuli. These circles were probably formed in connection with the Druidical or some other old religion, but nothing is known of their origin or date of construction. See *Standing Stones.*

Stoneman (stōn'man), GEORGE, soldier and statesman, was born in Chautauqua Co., New York, in 1822. He was graduated from West Point in 1846, was made captain in 1858 and brigadier-general of volunteers in 1861. He commanded the cavalry of the Army of the Potomac at the battle of Chancellorsville and in 1864 was captured, with much of his command, in a raid against Macon. He was promoted Major-general in 1865, was governor of California in 1886-87, and died Sept. 5, 1894.

Stone-ochre, an earthy oxide of iron which forms a yellow pigment.

Stone-pine, a tree of the genus *Pinus*, the *P. Pinea*, common in the south of Italy. See *Pine.*

Stone-plover, a large species of plover, the *Œdicnēmus crepitans.* It appears in England at the latter end of April, frequenting open hilly situations; makes no nest, but lays two eggs on the bare ground, and emigrates in small flocks about the end of September. Called also *stone-curlew* and *thick-knee.*

Stone River, BATTLE OF, one of the most sanguinary battles of the Civil war, fought Dec. 31, 1862, and Jan. 3, 1863, between the Army of the Cumberland, under Gen. Rosecrans (q. v.) and the Confederate forces under Gen. Bragg (q. v.), two miles east of Murfreesboro, Tenn. It ended in a victory for the Federals, though the losses on both sides were very heavy, being 13,249 for the Union, and over 11,000 for the Confederates. Gen. Bragg retired his forces to the line of the Duck river, and the Army of the Cumberland occupied Murfreesboro. Called also the *Battle of Murfreesboro.*

Stones, PRECIOUS. See *Gems.*

Stonesfield Slate (stōns'fēld), in geology, a slaty calcareous limestone, forming a constituent portion of the lower oölite formation, and abounding in organic remains. In it was first detected mammalian remains of the secondary epoch. See *Geology.*

Stoneware. See *Pottery.*

Stonington (stō'ning-tun), a town and port of New London county, Connecticut, 50 miles S. S. W. of Providence, on the Atlantic coast, with a capacious harbor. It has a considerable trade and manufactures of silks, velvets, and iron goods. This place was bombarded by a British squadron in 1814, but was successfully defended. Pop. (1920) 10,236.

Stool of Repentance, a seat in the parish churches of Scotland which those sentenced to expiate sins had to occupy.

Stoppage in Transitu, is the exercise of a right allowed by law to a seller to stop the delivery of goods purchased by a buyer who has become bankrupt while the goods are in the hands of a carrier or middleman for transmission. Stoppage in transitu, as the term implies, can only take place while the goods are actually on the way, since if they have arrived at their journey's end the seller's right over them has ceased.

Storage Battery, the name given an apparatus in which electricity is generated by chemical change of materials. Cells composed of

large sheets, or grids, of lead, superficially coated with protoxide of lead, are immersed in dilute sulphuric acid and polarized by passage of the current. As a result pentoxide of lead is formed on the positive plate and spongy metallic lead on the negative. When this has been accomplished by the electric current, the reverse charge sets up and the cells gradually return to their former chemical condition. In so doing they develop an electric current which may be used as a source of power. When the original condition has been restored they become inactive, but can be again charged as before. Such cells are grouped in series in storage batteries, and form a somewhat costly but convenient source of electricity. At first used for lighting and minor purposes, they have been improved and made more effective and are now of much service in moving autocars, passenger railway cars, etc. Efforts have been made to improve on the lead battery, and Edison has recently invented a nickel-iron storage battery, in which equal power is produced in a battery of half the weight of the lead battery. In this plates of nickel-plated steel are held in a form of nickel-plated iron, and perforated boxes of phosphate hold a mixture of oxidized nickel and pulverized carbon, the electrolyte being a solution of caustic potash. This battery has not yet come into much use, but large numbers of automobiles are equipped with lead storage batteries. These seem likely to prove better than gasoline engines for heavy auto-trucks.

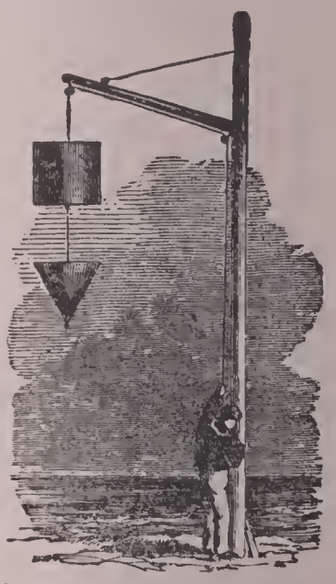
Storax (stō'raks), a resinous and odoriferous balsam. It is obtained by incisions made in the branches of the *Styrax officinālis*, a small tree which grows in the Levant, and is also known by the name of storax. The best is imported in red tears, but the common sort in large cakes. Storax has an agreeable, slightly pungent, and aromatic taste; it is stimulant, and in some degree expectorant.— *Liquid storax* is obtained from *Liquidambar styraciflua*, a tree which grows in Virginia, and from other species. It is greenish, of an agreeable taste and aromatic smell.

Stork, a name given to the birds of the genus *Ciconia* and of the subfamily Cicominæ. They are tall and stately birds, the beak being moderately cleft and destitute of a nasal furrow. The common stork (*Ciconia alba*) is found throughout the greater part of Europe, but passes the winter in Africa and Asia. The adult is pure white, with the exception of the black quill feathers of the wings, the scapularies, and greater wing-coverts, and the red beak, legs, and toes. It is about 3 feet 6 inches in length, and when erect its head is about 4 feet from the ground. It is remarkable for its affection toward its young. It is a common practice in parts of Europe, especially in Holland, to place boxes for storks to build in, and it is considered a good omen when the box on the roof is occupied. Children are told that the stork brings babies to the house. The black stork (*C. nigra*) occurs in Poland and Prussia and in the sequestered parts of the Alps. The American stork is the *C. Maquari;* and the gigantic stork, or adjutant of Bengal, is the *C. argala.*

Storm. See *Metcorology, Cyclone, Wind.*

Storm-glass, a weather-glass consisting of a tube containing a chemical solution sensible to atmospheric changes. In fine weather the substances in solution are said to settle at the bottom of the tube, leaving the liquid comparatively clear; previous to a storm the substances rise, and the liquid assumes a turbid and flocculent appearance.

Storm-signal, a cone and drum used at seaports and coast-guard stations to indicate the appearance of a storm. The cone exhibited alone with its apex down portends a south gale; with its apex up a north gale. The cone with the apex down and the drum over it portends dangerous winds from the south; with the apex up and the drum under dangerous winds from the north.



Storm-signal, indicating dangerous winds from the south.

Stornoway (stor'nō-wā), a police burgh and seaport on the island of Lewis, Ross-shire, Scotland, about 180 miles from Oban. It is the center of fishing industry in the Outer Hebrides, its export of fish being chiefly to the Baltic ports. Pop. 3852.

Storthing (stōr'ting), the parliament or supreme legislative assembly of Norway (which see).

Story (stō'ri), JOSEPH, an American lawyer, born in 1779; died in 1845. In 1808 he entered Congress, in 1811 became speaker of the Massachu-

setts State legislature, and soon after was appointed a judge of the United States Supreme Court. In 1829 he became professor of law at Harvard, a position which he held for the rest of his life. His law works include a number of special treatises, commentaries and judgments, and a collection of his miscellaneous writings was published in 1852.—His son, WILLIAM WETMORE STORY, born in 1819 at Salem, Mass., studied law, and published several law books, but gave up the legal profession; was long a resident of Rome, and was well known as a sculptor and poet. Died in 1895.

Stothard (stoth'ard), THOMAS, an English painter, born at London, in 1755; died in 1834. He early showed an aptitude for drawing, attempted book illustration and drew designs for magazines. Studying at the Royal Academy, be became a prolific designer. Among his more important works were designs for *Boydell's Shakespere*, *Robinson Crusoe*, *The Pilgrim's Progress*, *etc.* Other works were *The Canterbury Pilgrims*, *The Flitch of Bacon* and *Greek Vintages.*—His son CHARLES ALFRED STOTHARD, born in 1786; died in 1821, was an antiquarian and painter.

Stoughton (stō'ton), a town of Norfolk Co., Mass., 16 miles s. of Boston. Its products are boots and shoes, woolens, knit goods, rubber goods, etc. Pop. (1920) 6865.

Stoughton, a city of Dane Co., Wisconsin, 115 miles from Chicago, on Chicago, Milwaukee & St. Paul R. R., in a tobacco district. Has milk condensery and manufactures of farm implements, trucks, etc. Pop. 5101.

Stourbridge (stur'brij), a market town of England, in Worcestershire, 10 miles w. of Birmingham. Pop. 17,316.

Stovaine (stō'vān) is a highly complex chemical used as a local or regional anæsthetic. It crystallizes in small, brilliant scales, which melt at 175° C. (347° F.). It is a hydrocarbon derivative and soluble in water, methyl alcohol and acetic ether, slightly in absolute alcohol, and sparingly in acetone. It is quite stable and its solutions may be sterilized by heat at 115° C. (239° F.) without undergoing decomposition. It is precipitated from solution by the alkaloidal reagents and decomposed by alkalies. It is used especially by injection into the fluid within the vertebral canal in which the spinal cord is suspended, where, by temporarily paralyzing the spinal nerve tracts, insensibility to pain is produced, lasting from sixty to ninety minutes, during which surgical operations may be performed without pain and yet the patient remain conscious. Its use obviates the necessity and dangers of the inhalation of ether, chloroform, ethyl oxide and other inhalant anæsthetics. It cannot be used for operations on the head, neck, shoulders, arms or the upper part of the trunk above the diaphragm, since it would embarrass or stop the heart by paralyzing its nerve supply.

Stove (stōv), an apparatus of metal, brick or earthenware, which is heated within by a fire, generally almost excluded from sight. The heating medium may be burning wood, coal, petroleum or gas. The simplest of all forms is the familiar Dutch stove, a hollow cylinder of iron, standing on the floor, close at top, whence a small flue or chimney proceeds, with bottom bars on which the coals, etc., rest. But as this form was found objectionable from the metal becoming overheated and the air in the apartment becoming unwholesomely dry, many kinds of improved stoves have now taken its place.

Stow (stō), JOHN, an English historian and antiquary, born at London about 1525; died in 1605. His studies and books brought him under suspicion of the ecclesiastical authorities and efforts were made to incriminate him as a papist. His chief works were: *A Summary of Englische Chronicles*, *Annales* and *A Survey of London.* He printed editions of several antique works.

Stowe (stō), HARRIET ELIZABETH BEECHER, daughter of the Rev. Lyman Beecher and sister to Rev. Henry Ward Beecher, was born at Litchfield, Connecticut, in 1812; became associated with her sister Catherine in teaching a school at Hartford; removed to Cincinnati, and there married the Rev. Calvin E. Stowe in 1832; wrote several tales and sketches, and contributed to the *National Era*, a newspaper published at Washington, the serial story of *Uncle Tom's Cabin.* She issued this tale in book form in 1852, when it achieved an enormous success both in the United States and Europe. By its effect on the public mind it had a share among the influences that brought on the Civil war. Among her other numerous writings are: *Sunny Memories of Foreign Lands* (1854); *Dred, a Tale of the Dismal Swamp* (1859); *The Minister's Wooing* (1859); *Oldtown Folks*, one of her best novels; *Poganuc Peopl* etc. She died July 1, 1896.

Strabane (strá-bän'), a market town in Ireland, County of Tyrone, on the Mourne near its confluence

with the Finn, 15 miles S. W. of Londonderry. Shirt-making is the chief industry. Pop. 5033.

Strabismus (stra-bis'mus). See *Squinting.*

Strabo (strā'bō), a Greek geographer, a native of Amasia, in Pontus, was born about 54 B.C., and died about 21 A.D. His earliest writings were his *Historical Memoirs* and a *Continuation of Polybius*, both of which are now lost. His great work, however, on geography, in seventeen books, has been preserved entire, with the exception of the seventh book, of which there is only an epitome. The first two books are introductory, the next ten treat of Europe, the four following of Asia, and the last of Africa.

Stradella (strå-del'lå), ALESSANDRO, born at Naples about 1645, was chapel-master at Genoa, and composed oratorios, cantatas, madrigals, and operas. At Venice he became enamored of one of his pupils named Ortensia, the mistress of a Venetian noble, who eloped with him to Rome. They were followed, and several attempts were made by hired assassins to murder them. This was ultimately accomplished (1678) in Genoa. This tragical story forms the subject of an opera by Flotow.

Stradivari (strå-dē-vå'rē), ANTONIO (STRADIVARIUS), a celebrated violin-maker, who was born in Cremona, Italy, about 1649; died in 1737. He was a pupil of Nicolo Amati, in whose employment he remained until 1700, when he began making on his own account. It was he who settled the typical pattern of the Cremona violin, and his instruments, for tone and finish, have never yet been excelled.

Strafford (straf'urd), THOMAS WENTWORTH, EARL OF, an English statesman, the eldest son of Sir William Wentworth, was born in London in 1593, educated at St. John's College, Cambridge, and after leaving the university received the honor of knighthood. He sat in parliament for Yorkshire for a number of years, and when Charles I asserted that the Commons enjoyed no rights but by royal permission, he was strongly opposed by Sir Thomas Wentworth. In this struggle his abilities were recognized, and high terms offered him by the court, which he accepted, and in 1628 was successively created Baron Wentworth, privy-councilor, and President of the North. In the exercises of this authority he commended himself to Archbishop Laud, who selected him to proceed to Ireland as lord-deputy in 1632. Here he greatly improved the state of the country, both as regarded law, revenue, and trade; but to accomplish his ends he did not scruple to use the strongest and most arbitrary measures. For these services he was created Earl of Strafford. When the Long Parliament met the very first movement of the party opposed to arbitrary power was to impeach Strafford of high treason, with which charge Pym appeared at the bar of the House of Lords in 1640. His defense, however, was so strong that the original impeachment was deserted for a bill of attainder. The bill passed the Commons by a great majority, and was feebly supported by the House of Lords. The king endeavored to secure his safety, but yielded to the advice of his counselors, backed by a letter from Strafford himself, who urged him, for his own safety, to ratify the bill. Strafford was accordingly beheaded on Tower Hill in May, 1641.

Strain (strān), in mechanics, the force which acts on any material, and which tends to disarrange its component parts or destroy their cohesion, or the change resulting from application of such force. See *Stress*, *Elasticity*, *Strength of Materials.*

Straits Settlements, a British crown colony, deriving its name from the straits which separate the Malay Peninsula from Sumatra. It consists of the island of Singapore (the seat of government); the town and province of Malacca; the island of Penang and province of Wellesley; the islands and territory of the Dindings; the Cocos or Keeling Islands as a dependency; and it has an administrative control of the native states of Perak, Selangor, Sungei Ujong, Negri Sembalan, Johore and Pahang; area, about 35,000 sq. miles. The colony is administered by a governor and an executive and legislative councils. The chief exports are tin, pepper, sugar, sago, tea, coffee, and tobacco. Pop. about 573,000; Feudatory States, 357,000. See *Singapore*, *Penang*, *Malacca*, etc.

Stralsund (sträl'zunt), a seaport town of Prussia, in Pomerania, on the strait which separates the island of Rügen from the mainland, 115 miles north by west of Berlin. Its chief buildings are three massive Gothic churches and an ancient town-house. The manufactures consist of woolens. iron castings, machinery, sugar, etc., and there is a trade in grain and timber. This town was an important member of the Hanseatic League and during the Thirty Years' war successfully withstood a nearly three years' siege by Wallenstein. Pop. 31,813.

Stramonium (stra-mō′ni-um). See *Datura.*

Strange (stranj), Sir Robert, an eminent engraver, was born in Pomona, one of the Orkney Isles, in 1721; died in 1792. He studied law and attempted a seafaring life, but ultimately resolved to devote himself to painting. While thus engaged the rebellion of 1745 broke out, and he joined the Highland forces in Edinburgh, where he engraved a half-length portrait of the Pretender. After the battle of Culloden he went to France, gained a prize for design at Rouen, resided for some time at Paris, and in 1751 settled in London and became the founder of the English school of historical engraving. He received knighthood in 1787. His engraved plates, which number about eighty, evince an unusual combination of purity, breadth, and vigor.

Strangles (stran′glz), in farriery, a disorder which attacks horses; generally between the ages of three and five years. It consists of an abscess which occurs between the branches of the lower jaw. The disease is considered contagious. There is a similar infectious disease of swine called also *strangles.*

Strangulation (stran-gū-lā′shun), a sudden and violent compression of the windpipe, constriction being applied directly to the neck, either around it (as in hanging) or in the forepart, so as to prevent the passage of air, and thereby suspend respiration and life. If animation is only suspended by strangulation, the methods of restoring it are much the same as in drowning (which see).

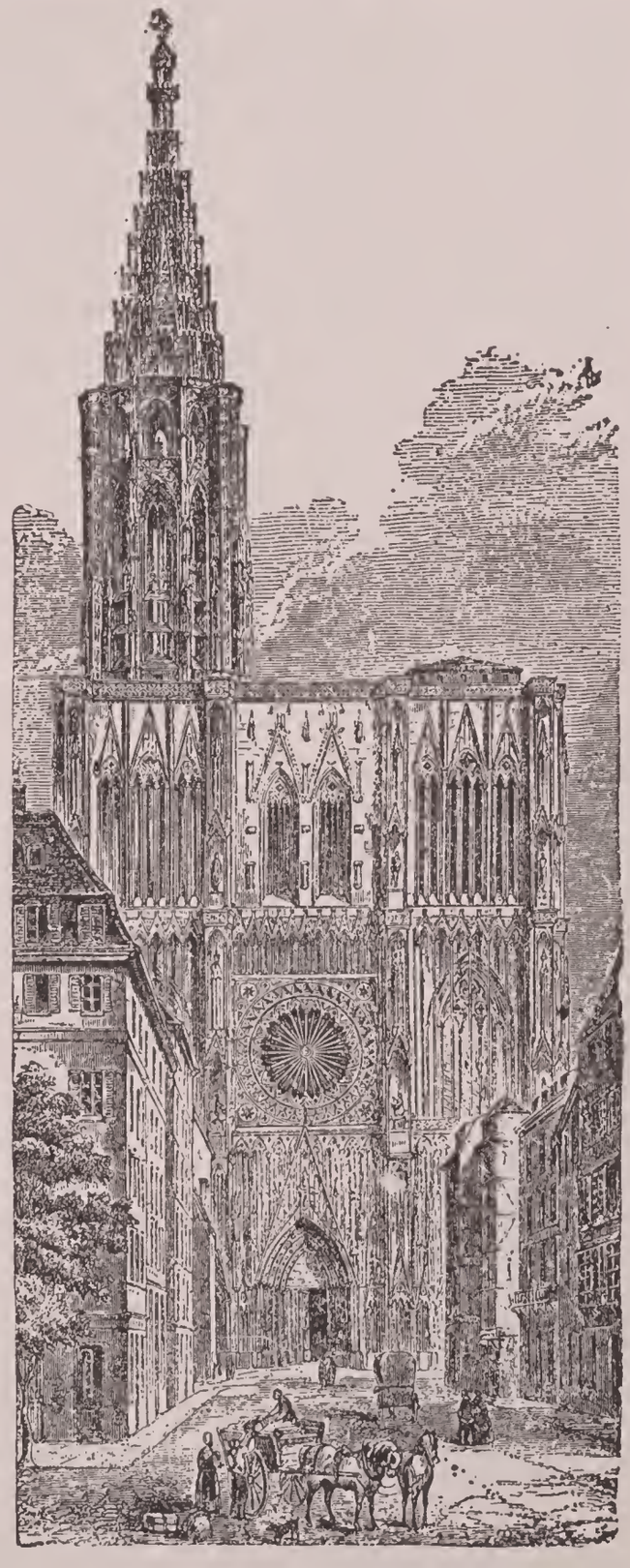
Strangury (strang′gū-ri), a disease in which there is pain in passing the urine, which is excreted with difficulty.

Stranraer (stran-rår′), a seaport of Scotland, county of Wigtown, at the head of Loch Ryan, 20 miles west of Wigtown. The principal buildings are the ruins of Kennedy Castle, and the town-hall and court-house. The chief trade is in agricultural produce. Pop. 6036.

Strappado (stra-pā′dō), a military punishment, which consisted of having the hands of the offender tied behind his back, drawing him up by them to a certain elevation by a rope, and then suddenly letting him drop to within a certain distance of the ground.

Strap-work, a style of architectural ornamentation or enrichment general in the fifteenth and sixteenth centuries, but of which specimens exist executed as far back as the eleventh century, consisting of a narrow fillet or band folded and crossed, and occasionally interlaced with another.

Strasburg (sträs′börg), or Strassburg, a town and fortress of Alsace, ceded to Germany in 1871, to France in 1918; situated on the Ill, about 2 miles west of the Rhine, to which



Strasburg Cathedral, West Front.

its glacis extends, 250 miles east by south of Paris, and about 370 miles southwest of Berlin. By means of canals which unite the Ill with the Rhine, Rhone, and Marne, it is brought into communication with the Atlantic and the Mediterranean. It has always been regarded as a place of strategical importance, and strong fortifications and a pentagonal citadel were erected by Vauban in 1682-84. Since the siege of 1870 by the Germans these have been considerably altered and strengthened, the new system of defense adopted including fourteen detached forts situated from three to five miles from the center of the town. The streets in the older parts are irregular and quaint of aspect, but since the removal of part of the old fortifications the modern portions have greatly expanded. The chief building is the cathedral, a structure which presents the architectural styles of the centuries from the eleventh to the fifteenth, in which it was built, but whose main element is Gothic. It is surmounted by a tower 466 feet high, has a splendid western façade, with statues and great rose-window, fine painted glass windows, and a famous astronomical clock. The other notable buildings are the church of St. Thomas, the Temple-Neuf or Neukirche, the old episcopal palace, the town-house, the new university building, opened in 1884, and the new imperial palace. The old episcopal palace contains the university and town library, numbering over 800,000 volumes. There are statues to Gutenberg and General Kléber, in squares correspondingly named, besides others. Its industries are very varied, and include tanning, brewing, machine-making, woolen and cotton goods, cutlery, musical instruments, artificial flowers, gloves, chemicals, and the preparation of its celebrated *pâtés de foie gras*. Strasburg, under the name of Argentoratum, is supposed to have been founded by the Romans, who erected it as a barrier against the incursions of the Germans, who ultimately possessed it. In the sixth century the name was changed to Strasburg, and in the beginning of the tenth century it became subject to the emperors of Germany. United to France in 1681, it was ceded with the territories of Alsace and Lorraine to Germany in 1871. Following the European war, 1914-18, Alsace-Lorraine was restored to France by the treaty of Versailles (see Treaty of Peace with Germany) and Strasburg, or Strasbourg, again became a French city. Population, 180,000.

Strategy (strat'e-ji), may be defined as the art of moving troops so as to be enabled either to dispense with a battle, or to deliver one with the greatest advantage and with the most decisive results. *Tactics* is the art of handling troops when in actual contact with the enemy. See *Battle*.

Stratford (strat'furd), a town of Fairfield Co., Connecticut, 3 miles E. of Bridgeport. It has machine shops and various manufactures. Pop. (1910) 5712; (1920) 12,347.

Stratford, county seat of Perth Co., Ontario. Division point on Grand Trunk Rwy., with many manufacturing plants. Pop. 17,000.

Stratford, a town of Essex, England, on the Lee; a suburb of London. The Great Eastern Rwy. shops are here. Pop. 50,738.

Stratford-upon-Avon, a municipal borough and market-town of England in Warwickshire, 8 miles southwest of Warwick, and about 100 miles by rail from London, famous as the birthplace of Shakespeare. The chief objects of interest are the house in which Shakespeare was born, and the parish church in which he was buried. The church interior was restored in 1840, and the tower rebuilt with the old material in 1867. Shakespeare's remains were interred in the chancel, and against the north wall are his monument and bust. There are several other churches, a town-hall, guild-hall, Shakespeare memorial theater, library, and picture-gallery. Pop. (1911) 8532.

Strath, in Scotland, a valley of considerable size, often having a river running through it and giving it its distinctive appellation; as *Strathspey, Strathdon, Strathearn, Strathmore*, etc.

Strathclyde (strath-klīd'), a kingdom formed by the Northern Romanized Britons which extended from the Clyde to the Solway, and had its capital in Dumbarton.

Strathcona (strath'kō-na), a town of Alberta, Canada, on the Canadian Pacific R. R. It has brewing and malting interests. Pop. (1911) 5579.

Strathcona, AND MOUNT ROYAL, DONALD ALEXANDER SMITH, BARON, a Canadian legislator and railroad-builder, was born at Archieston, Morayshire, Scotland, in 1820, and entered in early life the service of the Hudson Bay Company. For thirteen years he was occupied on the Labrador coast and afterwards in the Northwest wilderness, serving the company with such ability that he was eventually appointed its chief factor, and in the end was made resident governor. He served as a special commissioner in the first Riel rebellion, 1869-71, doing his duty so well as to re-

ceive the special thanks of the governor in council. In 1871 became a member of the first Manitoba parliament, and in the same year was elected to the Dominion House of Commons. In 1872 he was made a member of the first executive council of the Northwest Territory. He became largely interested in the railway development of Canada and gave years to the work of completing the Canadian Pacific Railway, which owed its success to him more than to any other man. His services in the interest of Canada were so valuable and excellent that in 1886 Queen Victoria conferred on him the honor of knighthood, and in 1897 raised him to the peerage as Baron Strathcona and Mount Royal. He was appointed to represent the Dominion of Canada in London as high commissioner in 1896. Other positions held by Lord Strathcona have been those of president of the Bank of Montreal, Lord Rector and Chancellor of Aberdeen University, and Chancellor of McGill University, while he has received a number of honorary university degrees. He died January 21, 1914.

Strathcona, a town of Alberta, Canada, on the south bank of the Saskatchewan River, opposite Edmonton, with which it is connected by a steel bridge. It is the northern terminus of the Calgary and Edmonton branch of the Canadian Pacific Railway. There are some manufactures and coal is mined in the vicinity. Strathcona is now amalgamated with Edmonton. Here is the University of Alberta, which was opened in 1908.

Strathmore (strath-mōr'), the general name given to the extensive valley of Scotland which stretches northeast from Dumbartonshire to Kincardineshire, having on one side the Grampians and on the other the Ochil and Sidlaw Hills; but it is popularly limited to the district which stretches from Methven in Perthshire to Brechin in Forfarshire.

Strathnairn (strath-nārn'), Hugh Rose, Baron, a British soldier, born in 1803; died in 1885. He entered the army in 1820, organized the Turkish defense in 1840, was consul-general for Syria, and in 1848 became secretary to Lord Stratford de Redcliffe. He served in the Crimean War and the suppression of the Indian mutiny, succeeded Lord Clyde as commander-in-chief in India, and from 1865 to 1870 was commander-in-chief in Ireland. He was raised to the peerage in 1866 and made field-marshal in 1877.

Strathspey (strath-spa') in Scotland, a species of dance in duple time, supposed to have been first practiced in the district from which it received its name. It resembles the reel, but has a slower movement.

Stratum (strā'tum), in geology, a layer of any deposited substance, as sand, clay, limestone, etc., which has been originally spread out over a certain surface by the action of water, or in some cases by wind, especially such a layer when forming one of a number superposed and forming a mass of rock. When strata do not lie horizontally but are inclined, they are said to *dip* towards some point of the compass, and the angle they make with the horizon is called the *angle of dip* or inclination. When strata protrude above the surface, or appear uncovered, they are said to *crop out.* They are said to be *conformable* when their planes are parallel, whatever their dip may be; and *uncomformable* when there is a want of parallelism between the strata. See *Geology.*

Stratus (strā'tus). See *Cloud.*

Straubing (strou'bing), a town in Lower Bavaria, on a height above the right bank of the Danube, 25 miles southeast of Ratisbon. The Stadtthurm (city tower) is an interesting thirteenth century relic. Pop. (1905) 20,856.

Straus, (strous), Oscar Solomon, an American diplomatist, was born at Ottenberg, Rhenish Bavaria, in 1850; came to the United States in 1854. In 1887 he was appointed United States minister to Turkey and again in 1893, holding the office until 1900. In 1902 President Roosevelt appointed him a permanent member of the Committee of Arbitration at The Hague. On December 24, 1906, he became Secretary of Commerce and Labor and in 1909 was appointed Ambassador to Turkey. He is the author of a number of works on religious liberty and United States political history.

Strauss (strous), David Friedrich, writer, was born at Ludwigsburg, Würtemberg, in 1808. He studied in Tübingen University; became assistant to a country clergyman in 1830; was appointed temporary professor in the seminary at Maulbronn; resigned this position and went to Berlin in 1831 to study under Schleiermacher and Hegel; returned to Tübingen and lectured on logic and philosophy; and published in 1835 his famous *Life of Jesus,* in which he attempted to prove that the gospel narratives had a mythical origin and growth. To his numerous critics he replied in *Streitschriften,* and *Zwei friedliche Blätter.* Appointed in 1839

to the chair of dogmatic theology in Zurich he was prevented from entering upon his duties by a storm of popular indignation, but received a small pension in recompense. His subsequent writings were many. In *Der alte und der neue Glaube* ('The Old and the New Faith,' (1872), his attitude toward Christianity was entire hostile. His more important works have been translated into English. He died February 8, 1874.

Strauss, JOHANN, an Austrian composer, born in 1825; son of Johann Strauss, a Viennese dance-music writer and conductor (1805-49). He toured through Europe, and in 1863 became conductor of the court balls at St. Petersburg. He wrote over 400 waltzes, many of them world-famous, and several successful operettas; died in 1899.—His brothers JOSEPH and EDWARD also distinguished themselves as composers and conductors.

Strauss, RICHARD, German composer and conductor, born in Munich in 1864. Since 1898 he has been first conductor at Berlin. As a composer he represents the ultra-modern school, and, while he has not the gift of melody, his mastery of orchestration is extraordinary. His symphonic poems are very popular and his operas, including *Salome* and *Electra*, have been sensational successes wherever produced.

Strawberry (strą'ber-i), a well-known fruit and plant of the genus *Fragaria*, nat. order Rosaceæ. It is remarkable for the manner in which the receptacle, commonly called the fruit, increases and becomes succculent; but the true fruit is the small seeds or achenes on the surface of the receptacle. The species are perennial plants, throwing out runners which take root and produce new plants; they are natives of temperate and cold climates in Europe, America, and Asia. The following species afford the varieties of cultivated strawberries: (1) Wood strawberry (*F. vesca*), found wild in woods and on hillsides throughout Europe, and now cultivated in gardens, as the red, the white, the American, and Danish Alpine strawberries. (2) The Alpine strawberry (*F. collīna*), a native of Switzerland and Germany. The varieties of strawberries called green are the produce of this species. (3) Hautbois strawberry (*F. elatior*), a native of North America. (4) Virginian strawberry (*F. virginiana* or *caroliniana*), a native of Virginia. To this species belongs many varieties cultivated in gardens, and known by the name of scarlet and black strawberries. (5) Large-flowered strawberry (*F. grandiflōra*) is supposed to be a native of Surinam, and to have furnished gardens with the sorts called pine strawberries. (6) Chile strawberry (*F. chilensis*), a native of Chile and Peru, and the parent of a number of mostly inferior strawberries. Strawberries are much valued for dessert, and for purposes of jam-making. The strawberry thrives in any good garden soil, and is propagated by seeds, by division of the plant, and by runners.

Strawberry-pear, a plant of the cactus family, the *Cereus triangulāris*, which grows in the West India Islands. Its fruit is

Strawberry-pear (*Cereus triangulāris*).

sweetish, slightly acid, pleasant, and cooling.

Strawberry-tomato, the name of a plant of the genus *Physălis* (*P. Alkekengi*), nat. order Solanaceæ. known also as *winter-cherry*, cultivated for its fruit, which is of a bright red color, of the size of a small cherry, and makes a delicate sweetmeat.

Straw Plait, straw plaited or braided into strips or tissues of some size for making hats, bags, ornaments, etc. In the manufacture of straw hats the straw must be of a certain length between the knots and must not be brittle; and these qualities are found most frequently in the wheat grown in Tuscany, where the well-known Leghorn hats are made. When the grain is still green the straw is pulled up by the roots, dried in the sun, bleached by means of sulphurous fumes, split by a machine, and then plaited into hats by women and young children as a domestic industry. Cer-

tain kinds of wheat cultivated around Luton, in Bedfordshire, were found suitable for plaiting, from which cause it became the center of the straw-plait industry in England. In the United States the making of hats, etc., from imported plait is now an extensive industry.

Streator (strē'tur), a city of La Salle Co., Illinois, on Vermilion River, 89 miles s. w. of Chicago. Coal is largely shipped from neighboring mines, and sewer-pipe, glass, hardware, etc., are made. Unlimited opportunities are here for the development of clay and glass industries. It is served by five railroads. Pop. (1920) 14,779.

Street, Julian (1879-), an American author, born in Chicago. Author of *The Need of Change*, *Abroad at Home*, a comedy with Booth Tarkington called *The Country Cousin*, etc.

Street Railways, railways specially designed for local passenger traffic. The first was laid in New York City in 1831, by John Stephenson, but was a financial failure. In 1845 it was resumed. In 1852 many other lines were projected and commenced. The first motive power was by means of horses, but in 1873 Hallidie built a road in San Francisco on which the cars were drawn by an endless cable which ran over a drum and pulleys in a conduit beneath the surface on which the rails were laid. This motive power came into considerable use but after 1885 was rapidly superseded by electricity applied by overhead wires, the connection with the car being made by means of a trolley and flexible pole. Other means of propulsion are the 'third rail' and the underground wire electric methods, compressed air, storage batteries, etc., in all of which the United States is far in advance of other nations. Electric lines of railway have nearly superseded all others and now run out from American cities far into the adjacent country and greatly add to the convenience of travel, they having been extended until continuous rides can be had for several hundred miles. The principle is being rapidly applied to the railroad traffic. See *Electric Railway*.

Strength of Materials.

The strength of any material is the resistance which it opposes to alteration of form or to fracture by any application of force. Materials are subject to many forms of strains, and some are better qualified to resist strains of a certain kind than others. Stone, for example, is admirably constituted for supporting immense weights, but it would not offer much resistance to a direct pull. Cast-iron is superior to wrought-iron in resisting a pull or tensile stress, but the latter excels the former in its resistance to a thrust or compressive stress. A material is exposed to five distinct strains: a tensile or stretching strain in the direction of its fibers, as in the case of ropes, tie-beams, etc.; a transverse strain acting perpendicularly or obliquely to its length, as in levers, joists, etc.; a crushing strain by pressure, as in the case of pillars, posts, etc.; a torsional or twisting strain acting in a perpendicular direction at the extremity of a lever or otherwise, as in axles, crank-shafts, etc.; and a shearing force applied laterally, as in the case of a shearing-machine for cutting through iron plates and bars. Wrought-iron and steel offer the greatest resistance to tensile strains; the strength of wood in this direction varies according to its seasoning and specific gravity. The heavier the wood is, in general, the stronger it is. The transverse strength of beams is determined largely by their elasticity. This property varies greatly in different materials. Wood has a greater elastic range of action than iron or steel bars, and consequently sinks or deflects to a greater degree under a given weight. Any strain beyond the *elastic limit* entails fracture. Increased stiffness or transverse resistance of beams is rapidly obtained with an increase of depth of the beam. With the exception of wood, materials offer a greater resistance to a crushing force than to a tensile strain. Cast-iron is superior to wrought-iron in this respect, and is consequently much employed in the construction of bridges and foundations. Torsional stress tries the solidity and tenacity of metals more than any other kind of stress. But the torsional strength of shafts increases very rapidly as the diameter is enlarged. The distribution of material in hollow forms conduces to the greatest strength and stiffness in combination with the minimum consumption of material. A familiar instance of the hollow construction is the stem of grasses, and especially the bamboo, while another example is that of the hollow bones of animals.

Strepsiptera (strep-sip'ter-a; 'twisted-winged'), a small and very peculiar and anomalous order of insects. The females are wingless, and live as parasites in the abdomens of bees, wasps, and other hymenopterous insects. The males have their

front pair of wings in the form of twisted filaments, the posterior pair are fan-shaped and membranous. The jaws are rudimentary. The heads of the parasitic females protrude from between the abdominal joints of their host. The strepsiptera are viviparous, and the

Strepsiptera.

a, Stylops Dalii, male insect. *b,* Do. magnified. *c,* Anterior wings. *d,* Double antennæ.

larvæ are little caterpillars which attach themselves to the bodies of wasps and bees. The female larvæ never leave their hosts; the male larvæ undergo their metamorphosis within the bodies of their hosts, from which in due time they emerge as perfect winged males. *Stylops Dalii* and *S. Spencii* are among the more common species.

Strepsirhi'na ('twisted-nostrils'), one of the three chief divisions into which the order of Quadrumana or monkeys is sometimes arranged, represented by such forms as the aye-aye or cheiromys of Madagascar, by the lemurs, loris, etc. See *Lemur*, etc.

Stress, in mechanics, a term sometimes used as equivalent to *strain*, at other times used as the force producing strain, the latter referring to the amount of change produced. See *Strain*.

Strickland (strik'land), AGNES, an English authoress, born in 1796 at Reydon Hall, near Southwold, Suffolk. She wrote, in conjunction with her sister Elizabeth, *Lives of the Queens of England* (twelve vols., 1840-48); *Lives of the Queens of Scotland* (eight vols., 1850-59). She also published *Letters of Mary Queen of Scots, with an Historical Introduction and Notes; Lives of the Bachelor Kings of England; Lives of the Tudor Princesses;* poems, stories, etc. She died in 1874.

Stricture (strik'tūr), a contraction of a tube, duct, or orifice; for instance, of any part of the alimentary canal or of the urinary passages. This disease usually affects the urethra, and is treated by dieting and dilatation of the passage by means of catheters.

Striegau (strē'gou), a town of Prussia, province of Silesia, 27 miles W. S. W. of Breslau. It has granite quarries and polishing works. On June 4, 1745, the Austrians and Saxons were defeated here by Frederick the Great. The industries are cigar-making, malt, and machinery. Pop. 13,427.

Strigidæ (strij'i-dē), a family of nocturnal birds of prey, comprehending the owls.

Strigops (strī'gops). See *Owl-parrot.*

Strike (strīk), the action taken by workmen in any branch of industry when they cease from work with the object of compelling their employer to concede certain demands made by them; distinguished from a *lock-out*, which is the retaliatory measure adopted by the employers to resist such demands by stopping their works. Great strikes, often involving hundreds of thousands of workmen, have been numerous during the past century, alike in the United States and Europe. They have occasionally led to great destruction of property as in the railroad strike in Pennsylvania in 1877, and loss of life as at Chicago in 1886, Homestead, Pa., in 1892, and the exceedingly violent strike in the coal-mining industry of Colorado in 1913 and 1914, which resulted in the loss of life of 19 persons, most of them women and children, victims of the militia which had been requisitioned. The tragedy took place at Ludlow in April, 1914, and became known as the 'Ludlow Massacre'. The Lawrence, Mass., strike of 1912, involving 35,000 workers, was notable as the first large Eastern strike conducted by the I. W. W. This organization was also responsible for the Paterson, New Jersey, strike of 1913, involving several thousand silk workers.

In 1916 the railroad trainmen of the United States, numbering 400,000, threatened to strike, unless their demand for an eight-hour day at the existing ten-hour wage was granted. The strike order was issued, to become effective September 4. This was in the midst of the European war. President Wilson appealed to Congress and a law was passed making the eight-hour day the legal basis for railroad employees. There were many strikes in 1917, all of them settled by arbitration.

Owing to the great demand for labor, the scarcity of supply, and the high wages offered, the strikes in 1918 had been reduced to a minimum. Among the agencies of the government for the settlement of trade disputes are the U. S. Board of Mediation and Conciliation, the Railroad Wage Commission, the Shipbuilding Wage

Adjustment Board and many others. See *Trades' Unions.*

Strindberg (strind'bār-y'), JOHAN AUGUST, a Swedish novelist and dramatist, born at Stockholm, January 22, 1849; died in 1912. After various experiments as schoolmaster, tutor and actor, he turned to literature as a profession. He began writing as an exponent of realism and marked characteristics of all his work are his hatred of woman and of existing institutions. He is best known in America through his plays, *Miss Julia, The Father, Creditors, Pariah,* and *Easter.*

Stromboli (strom'bō-lē), one of the Lipari Islands in the Mediterranean, north of Sicily, with a volcanic cone almost constantly active. See *Lipari Islands.*

Strombus (strom'bus), or WING-SHELLS, the name given to a genus of marine tropical gasteropods. The aperture is much dilated, the lip expanding and deeply notched. The giant strombus (*S. gigas*), of the West Indies, is largely used for cameos and is ground for use in the manufacture of porcelain.

Strong, JAMES, an American theologian and educator, born in New York City in 1822; died in 1894. He was professor of biblical literature and acting president of Troy University, 1858-61; professor of exegetical theology

Winged Strombus (*s. tricornis*).

in Drew Theological Seminary, Madison, N. J., 1868; traveled as a member of the Palestine Exploration Committee, 1874; was one of the committee selected to revise the O. T. section of the authorized version, and with John McClintock edited the *Cyclopedia of Biblical, Theological and Ecclesiastical Literature.*

Strongylus (stron'ji-lus), a genus of intestinal roundworms. *S. gigas* is the largest nematode worm at present known to infest man or any other animal, the male measuring from 10 inches to 1 foot in length, while the female is said to attain a length of over 3 feet.

Stronsay (stron'sā), one of the Orkney Islands, 12 miles N. E. of Kirkwall; about 7 miles long and 4½ miles broad. It is of moderate elevation; its coasts are deeply indented; and the soil good. Pop. 1274.

Strontia. See *Strontium.*

Stronianite (stron'shi-an-īt), a mineral, native strontium carbonate, varying in color from white to yellow and pale green, and occurring massive, fibrous, stellated, and (rarely) in orthorhombic crystals, resembling those of aragonite in form. It was first discovered in the lead mines of Strontian, Argyleshire, Scotland.

Strontium (stron'shi-um), one of the metals, of a yellowish color; specific gravity 2.54; atomic weight 175; chemical symbol Sr. It burns when heated in air with a crimson flame. It is less abundant than barium, and occurs in nature in similar forms of combination. The oxide is called *strontia.*

Strophanthin (strō-fan'thin), a crystalline glucoside with a strongly bitter taste, obtained from the seeds of *Strophanthus hispidus,* a plant belonging to the nat. order Apocynaceæ, and a native of Africa. It is readily soluble in water and alcohol. Strophanthin is a muscle-poison, and increases the contractile power of the muscles. It has been used with great advantage as a tonic in heart disease. It strengthens the heart-beat and reduces its frequency.

Strophe (strō'fē; Greek, *strophē,* from *strephō,* I turn), the name of one of the divisions of a Greek choral ode, corresponding to the *antistrŏphē.* The singing of the strophes on the stage was accompanied with a motion or turn from right to left; the singing of the antistrophe, with a contrary motion, from the left to the right.

Stroud (stroud), a town of Gloucestershire, England, 9 miles S. of Gloucester. It is a center of cloth factories and dyeworks. Pop. 8767.

Stroudsburg, county seat of Monroe Co., Pa., near Delaware Water Gap, 75 miles from New York. Summer resort; also has car shops, textiles and other manufactures. Pop. (1920) 5278.

Struensee (strų'en-zā), JOHANN FRIEDRICH, COUNT, born in 1737 at Halle on the Saale; studied medicine, and in 1768 was appointed physician to Christian VII of Denmark. He advised the king (who was little better than an imbecile) to abolish the council of state, a measure which roused the indignation of the Danish nobility, since it threw all authority into the

hands of the queen and the favorite. He was instrumental in the enactment of a number of reform laws, but antagonized the clergy by his outspoken skepticism. He was accused of having conspired against the king, and of being the lover of the queen; was sentenced to death, and executed April 28, 1772.

Struthers, a village of Mahoning Co., Ohio, on Mahoning River, 5 miles S. E. of Youngstown. It has extensive steel and iron works, sheet and tube works, etc. Pop. (1920) 5847.

Struthio (strö'thi-ō). See *Ostrich.*

Struthionidæ (strö-thi-on'i-dē), a family of terrestrial birds incapable of flight, the wings being, in the majority of instances, merely rudimentary, but having long and strong legs, which enable them to run with great rapidity. This family includes the ostrich, cassowary, emu, etc., and is equivalent to the Brevipennes of Cuvier and the Ratitæ of Huxley.

Strutt, JOSEPH, an English antiquary, born in 1742 or 1749, was articled to W. W. Ryland, the engraver, and obtained the gold and silver medals of the Royal Academy. In 1773 he published his *Regal and Ecclesiastical Antiquities from Edward the Confessor to Henry VIII*, and shortly afterwards his *Horda Angel-Cynnan, or Manners, Customs, etc., of the English* (1774-76, three vols., with 157 plates). He published other works of similar character, and left some manuscripts, from which were afterwards published his *Queenhoo-Hall*, a romance, concluded by Sir Walter Scott; *Ancient Times*, a drama; also *The Test of Guilt, or Traits of Ancient Superstition*, a dramatic tale. He died in 1802.

Struve (strö'vė), FRIEDRICH GEORG WILHELM VON, astronomer, born at Altona, Germany, in 1793, and was educated at Dorpat University. In 1813 he entered the Dorpat observatory, and was appointed director in 1817. On the completion of the Russian observatory at Pulkova, near St. Petersburg, in 1839, he was nominated its director, and here he continued his researches on nebulæ and double stars. From 1816 to 1819 he was engaged on the triangulation of Livonia, and from 1830 to 1845 he was connected with the measurement of the arc of the meridian in the Baltic provinces, which was afterwards extended to the Arctic Ocean and the Danube. He died in 1864.

Stry, or STRYI (strē), a town of Austria, in Galicia, situated on a river of the same name. It was the scene of a great conflagration in April, 1886, which destroyed over 600 houses and most of the public buildings. The chief manufactures are leather goods and matches. Pop. 23,205.

Strychnine (strik'nīn; $C_{21}H_{22}N_2O_2$), an alkaloid existing in nux-vomica, St. Ignatius' beans, and in various other plants of the genus *of Strychnos* (which see). Strychnine may be prepared from nux-vomica by treating with rectified spirit, acetate of lead, etc., precipitating with ammonia, dissolving the precipitate with alcohol, and crystallizing. Strychnine forms colorless four-sided prisms, which are inodorous and intensely poisonous. One-eighth of a grain of strychnine is sufficient to kill a large dog: three-eighths of a grain produces violent tetanic spasms in man, while half a grain has been known to prove fatal. When taken in small doses for a long period of time the drug produces increased excitability of the nerves. Strychnine resists putrefaction, and may therefore be detected in bodies which have been buried for a long time. This alkaloid combines with acids, forming a series of well-defined salts; a series of strychnine derivatives is also known, in which the hydrogen is partly replaced by such groups as ethyl (C_2H_5), amyl (C_5H_{11}), etc.

Strychnos (strik'nos), a genus of plants, nat. order Loganiaceæ. It is composed of trees or shrubs which do not yield a milky juice, and have opposite, usually nerved leaves and corymbose flowers; some of the species are possessed of tendrils, and are climbing plants. They are found principally in the tropical parts of Asia and America. Among the species are *S. nux-vomĭca*, nux-vomica, poison-nut, or ratsbane; *S. potatōrum*, or clearing-nut; *S. Ignatii*, or St. Ignatius' bean; *S. colubrīna*, or snakewood; *S. toxifĕra*, woorali or poison-plant of Guiana. See the separate articles.

Strype (strīp), REV. JOHN, ecclesiastical historian, born at London in 1643, and was educated at St. Paul's School, and Cambridge University, where he graduated B.A. in 1665. In 1669 he became vicar of Low Leyton, and remained there till within a few years of his death. He published nothing till after he was fifty, and his works consist for the most part of transcriptions of curious and valuable papers, which he brought to light for the first time. The chief of them are *Memorials of Cranmer* (1694), followed by the Lives of Sir Thomas Smith, Bishop Aylmer, Archbishop Parker, and Arch-

bishop Whitgift. His *magnumopus* was *Ecclesiastical Memorials* (three vols., 1721). He died at Hackney in 1737.

Stuart (stö'ĕrt), THE FAMILY OF. This house derives its name from the important office of steward of the royal household of Scotland. The name is often written *Stewart*, and occasionally *Steuart*. The form of *Stuart* was first assumed when Queen Mary went to France, and was adopted by all her descendants. The founder of the house seems to have been a Norman baron named ALAN, whose second son, WALTER, entered the service of David I of Scotland, and became *dapifer*, or steward of the royal household. Walter obtained large grants of land from David, and died in 1246. ALEXANDER, the fourth steward, had two sons — JAMES, who succeeded him in 1283, and JOHN, known in history as the Sir John Stewart of Bonkyl, who was killed at Falkirk (July 22, 1298). James was chosen as one of the regents on the death of Alexander III, and died in the service of Bruce in 1309. His son, WALTER, the sixth steward, married Marjory, daughter of King Robert I, a union which secured to his family the crown of Scotland in the event of the extinction of the royal line. He died in 1326, and was succeeded by his son, ROBERT, the seventh steward, who, on the death of David II without issue, succeeded to the crown as Robert II in 1371. For the subsequent history of the royal line see the articles *Scotland; Robert II; Robert III; James I, II, III, IV, V; Mary Stuart; James I (of England); Charles I and II; James II; William and Mary;* and *Anne.* Mary of Modena, second wife of James II of England, gave birth to James Edward Francis, prince of Wales, commonly called the Old Pretender, or the Chevalier St. George. In 1715 an unsuccessful attempt was made by the Jacobites, or Stuart party, to set this prince on the throne of his ancestors by force of arms. He married a granddaughter of John Sobieski, king of Poland, by whom he had two sons, Charles Edward, the Young Pretender (see *Charles Edward Stuart*), and Henry Benedict Maria Clement, who became a cardinal in 1747. The last male representative of the branch of the Stuart line descended from Henrietta Maria, daughter of Charles I, was Francis V, ex-duke of Modena, who died childless, November 20, 1875. Many of the noble families of Scotland are descended from other branches of the Stuart line.

Stuart, ARABELLA, born at Chatsworth in 1575, was the only child of Charles Stuart, earl of Lennox, brother of Lord Darnley, and was great-granddaughter of Margaret Tudor, daughter of Henry VII, thus being in the line of succession to the English throne. On the death of Queen Elizabeth, an abortive conspiracy was formed for setting up Arabella Stuart in opposition to her cousin James. Her private marriage to William Seymour, grandson of the Earl of Hertford, alarmed the court, and she and her husband were placed in confinement. They both escaped, but the Lady Arabella was recaptured and placed in the Tower, where she remained a close prisoner until her death on September 27, 1615.

Stuart, CHARLES EDWARD. See *Charles Edward Stuart.*

Stuart, GILBERT CHARLES, painter, born at Narragansett, Rhode Island, in 1755. He studied in London under Benjamin West, and painted there a number of portraits with such ability as to win a high reputation. After his return to the United States he painted a portrait of Washington, which is esteemed the best ever made; also portraits of Adams, Jefferson, Madison, Mrs. Washington, and other distinguished Americans. He died July 27, 1828.

Stuart, JAMES ELWELL BROWN, soldier, born in Patrick Co., Virginia, in 1832; was graduated from the West Point Military Academy in 1854; and became captain in 1860. In 1861 he resigned his commission in the United States army and entered the Confederate service. He was in charge of the Confederate cavalry at the first battle of Bull Run and in October, 1862, made a daring and successful raid to Chambersburg, Pa. He was promoted Major-General and commanded troops at Chancellorsville, Gettysburg, and the Wilderness, and on May 12, 1864, was mortally wounded in a fight with Sheridan's cavalry.

Stuart, JOHN M'DOUALL, a celebrated Australian explorer, born in Scotland in 1818. In 1844-46 he accompanied Sturt's expedition as draughtsman, and in 1858, making six expeditions into the interior, he successfully explored the country west of Lake Torrens, in South Australia. In 1862 he achieved the difficult task of crossing the Australian continent near the center from south to north. He died at London in 1866. He wrote *Explorations in Australia,* edited and published in 1864 by W. Hardman, London.

Stuart, MOSES (1780-1852), an American theologian, born at Wilton, Connecticut, and educated at Yale. He was called to the bar in 1802, but abandoned law for theology. In 1810 he was appointed professor of sacred literature, at the theological seminary in Andover, a post he held for thirty-eight years, during which time he published several Greek and Hebrew grammars, commentaries on some of *St. Paul's Epistles* and on the *Apocalypse*, *Hints on the Prophecies*, *A Critical History and Defense of the Old Testament Canon*, and many other works.

Stuart, RUTH MCENERY, an American author, born at Avoyelles, Louisiana, in 1856; died May 4, 1917. She was educated at New Orleans; removed to New York in 1885. She was the author of many humorous negro dialect tales. Her publications include *A Golden Wedding and Other Tales*, *Carlotta's Intended*, *The Story of Babette*, *Sonny*, *Holly and Pizen*, *Napoleon Jackson*, *George Washington Jones*, *Sonny's Father*, *Daddy Do-funny's Wisdom Jingles*, *The Cocoon*, etc.

Stubbs, GEORGE (1724-1806), an English animal painter, engraver and anatomist, famous for his paintings of horses.

Stubbs (stubs), WILLIAM (1825-1901), an English historian and divine. Educated at Oxford University he became vicar of Navestock, Essex, in 1850. He subsequently held several important positions and in 1888 became bishop of Oxford. He edited many valuable historical works in the Rolls Series, including *Chronicles and Memorials of the Reign of Richard I*, *Gesta Regis Henrici II*, *Chronicle of Roger Hoveden*, *Memorials of St. Dunstan*, and *Opera Radulphi de Dieeto*. His chief work is the *Constitutional History of England*.

Stucco (stuk'kō), a fine plaster, used as a coating for walls, and to give them a finished surface. Stucco for internal decorative purposes is a composition of very fine sand, pulverized marble, and gypsum, mixed with water till it is of a proper consistency. The stucco employed for external purposes is of a coarser kind, and variously prepared, the different sorts being generally distinguished by the name of cements. Some of these take a surface and polish almost equal to that of the finest marble. The third coat of three-coat plaster is termed stucco, consisting of fine lime and sand. The term is loosely applied to any plaster or cement used for the outside coating of buildings, as, for example, a 'stucco house' means one coated outside with stucco.

Stud-book, a book containing the pedigrees of famous animals, especially horses. There are stud-books also for cattle, special breeds of dogs, etc.

Studding-sails (stud'ing-sāls), formerly called *scudding-sails*, fine-weather sails set outside the square sails. The top-mast and top-gallant studding-sails are those which are set outside the top-sails and top-gallant-sails; they have yards at the head, and are spread at the foot by booms which slide out on the extremities of the lower and top-sail yards, and their heads or yards are hoisted up to the top-sail and top-gallant-sail yard-arms.

Student Self-government, pupil self-government, or self-government in schools, are self-explanatory terms. George Kiernan tells us 'Thomas Jefferson recommended a modified plan of student discipline for the University of Virginia. Thomas Hill, in England, a century before, conducted his school on a basis of student participation in the government. Vittorino de Feltra, in the Middle Ages, preached the doctrine of learning by doing, and recommended the boys be allowed to share with the master the administration of the school.' The 'monitor' system has been quite common practice in English schools the last 150 years; but monitors represent the head master not their fellow-pupils. In the United States Dr. Bernard Cronson, aided by William Gill, philanthropist, in 1895, established the 'school city' system of pupil self-government in New York Public School No. 69, and made it a success. Later he installed the system in School 125, Manhattan, under a charter whose opening clause read: 'Whereas, the pupils of Public School 125, Manhattan, The City of New York, have demonstrated by their conduct that they are prepared to assume the responsibilities of self-government, and that they are capable of appreciating its benefits,' etc.

Authorities are careful to warn that such a self-governing system may result in failure unless the classes or schools have demonstrated their moral and mental capacity equal to the performance of the necessary functions. They attribute the numerous successes to the fact that the pupils have had the necessary training in obedience and self-control; the failures they ascribe to lack of such training.

The theory has these two main ele-

ments as aim: (1) *civic* and (2) *ethical*. Under the first heading there is individual practice in the conducting of the government under which they will have to live. Under the second heading there is the development of the powers of individuals to shape their conduct in accordance with a preconceived moral standard. This includes self-control and self-direction, inhibition of wrong impulses and initiation of proper acts. Cronson's 'school city' system had the following departments: Legislative, Executive, and Judiciary. The legislative department included a Board of Aldermen; executive power was vested in a mayor. There was a police department to suppress noises, lateness, etc.; also a health department to stop dirt and filth accumulation. Officers might be removed by the mayor for neglect of duty or violation of the school laws. The judiciary department's courts had power in cases of violations of the laws and ordinances of the school and subpoenaed witnesses, convicting or acquitting by vote of jury. Those prosecuted were represented, if desired, by counsel; and the 'city' was represented by the city attorney.

Self-government successes are numerous in the United States, but it must be admitted that there have been many failures. There are so many advocates of self-government in schools as to call into being the organization of a Self-Government Committee to propagate the system. Most systems in practice are modifications of the Cronson plan. A State Normal School is governed by six wards, elects a mayor, two commissioners, city treasurer, city clerk, police board, chief of police, policemen, municipal judge and clerk of the court. The faculty acts as 'supreme court of advice.' Advocates of the plan say it 'has improved self-control, bettered exercise of good judgment, given higher standard of scholarship, etc.' Another system provides for each class: president, vice-president, secretary and marshal. In 1895 was established the 'George Junior Republic' (founded by William R. George), near Freeville, N. Y. Originally for youthful delinquents, it soon included all classes and conditions of society. Other citizenship colonies multiplied till the present National Association of Junior Republics was needed.

Certain objections, of course, have been raised against the movement. A real difficulty is to get students to play the part of 'informer' against their fellows, even in secret reports. Enthusiastic success at the start, as a novelty alluring the youngsters, is liable to turn later to abuse, antipathy, etc., if the faculty does not vigorously back and sustain the work. The teachers cannot escape their responsibilities for administration, *they cannot abdicate*. Complaint has come from the college that the plan takes up too much of the time and attention of the individuals who should strictly concentrate all energy on their studies; it is a source of distraction. A Western college dean says: 'It will never be an expert government. My own belief in it is founded on its value as an educator.'

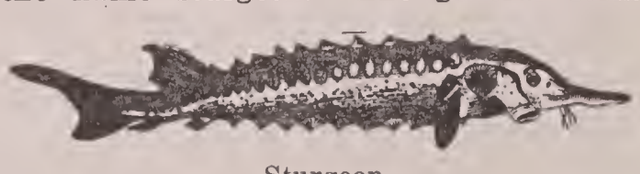
Stuffing-box, a contrivance for securing a steam, air, or water-tight joint when it is required to pass a movable rod out of a vessel or into it. It consists of a close box cast round the hole through which the rod passes, and in which is laid, around the rod and in contact with it, a quantity of hemp or other material called *packing*, this packing being lubricated with oily matter. The stuffing-box is used in steam-engines, pumps, on the shaft of a screw-steamer where it passes through the stern, etc. See *Piston*.

Stuhlweissenburg (stöl' vīs-ė n-bu̇r*h*), a town of Hungary, 30 miles southwest of Budapest. It was for five centuries the crowning-place of the Hungarian kings, but has now lost its former importance. It contains some fine buildings, among which are a cathedral, built in 1752, a bishop's palace, and a theater. Pop. 36,625.

Sturdee (stur'dē), Sir F. C. Doveton, an English admiral of the fleet, born in 1859. He was commander of H. M. S. *Invincible* in the action off the Falkland Isles, in December, 1914, in which the German admiral Von Spee went down with four of his ships. He also took part in the naval battle of Jutland (q. v.).

Sturdy (stur'di), a parasitic disease of sheep. See *Staggers*.

Sturgeon (stur'jun), a ganoid fish of the genus *Acipenser*, family Sturionidæ, the members of which family are all popularly included under the name sturgeon. The general form



Sturgeon.

of the sturgeon is elongated and rather slender, the snout long and pointed; the body is covered with numerous bony plates in longitudinal rows; the exterior

portion of the head is also well mailed; the mouth placed under the snout is small and funnel-shaped, without teeth, and provided with tentacle-like filaments or barbules. The eyes and nostrils are on the side of the head. On the back is a single dorsal-fin, and the tail is forked, but is heterocercal or unequally lobed, and is provided with a row of spines along its upper margin. The sturgeons are sea-fish, but ascend the larger rivers of Europe in great abundance, and are the objects of important fisheries. The flesh of most of the species is wholesome and agreeable food; their roe is converted into caviare (see *Caviare*), and their air-bladder affords the finest isinglass. The common sturgeon (*Acipenser sturio*) inhabits the North American and European seas, migrating during early summer into the larger rivers and lakes. Its flesh is firm and well-flavored, somewhat resembling veal. The general body color is yellow; its length is usually 5 or 6 to 8 feet, but it may reach 12 feet. The food consists of molluscs, small crustaceans and small fishes. When caught in the Thames, within the jurisdiction of the Lord-mayor of London, it may be claimed by that dignitary; formerly it used to be regarded as a *royal* fish reserved for the sovereign. The sterlet (*A ruthēnus*) is found in the Volga and the Danube. Its flesh is the most delicate, and its roe yields the best caviare. The great or white sturgeon, or beluga (*A. huso*), is found in the Danube, the Volga, and other rivers running into the Black and Caspian Seas. It frequently exceeds 12 and 15 feet in length, and weighs above 1200 pounds. The flesh is not much esteemed, but the finest isinglass is made from its air-bladder. There are several species peculiar to North America. One of these, the fresh-water sturgeon, (*A. rubicundus*), inhabits the great lakes and connected streams.

Sturgis a city of St. Joseph Co., Michigan, near the Indiana border, 80 miles s. of Grand Rapids. Manufactures include furniture, brass goods, foundry and machine-shop products, cutlery, tanks, etc. Pop. (1910) 3635; (1920) 5995.

Sturgis, Russell, architect and author, born in Baltimore Co., Maryland, in 1836; died February 11, 1909. He was graduated from the College of New York in 1856, studied architecture, practiced it until 1880; afterwards became active in the management of Art Societies in New York and in lectures on art subjects. He wrote much on art, his works including *European Architecture, The Appreciation of Sculpture, History of Architecture*, etc.

Sturluson, Snorri. See *Snorri Sturluson.*

Sturnus. See *Starling.*

Sturt, Sir Charles, an Australian explorer, born in India in 1796. He entered the army, and in 1825 was stationed at Sidney, New South Wales, with the rank of captain. In 1828 he led an expedition to explore the interior of Australia, and discovered the Macquarie, Castlereagh, and Darling rivers. He also explored the Murrumbidgee, and in 1830 discovered the Murray. In 1844 he penetrated to the great barren region nearly in the center of the continent. Subsequently he was made colonial secretary of South Australia, and the exposure to which he was subjected having undermined his health, he received a pension from the colony. He returned to England totally blind, and died in 1869. He wrote *Two Expeditions into the Interior of South Australia in 1828-31* (Lond. 1833), and *Narrative of an Expedition into Central Australia in 1844-46* (Lond. 1849).

Stuttering. See *Stammering.*

Stuttgart (stut'gärt), capital of the kingdom of Würtemberg, S. Germany, beautifully situated near the left bank of the Neckar, and closely surrounded by vineyard slopes, 816 feet above the sea. With the exception of part of the lower and older town, it consists of spacious streets and squares lined with fine buildings, among the latter being the new palace, finished in 1807; the old palace (1570); the Stiftskirche, a Gothic structure of the fifteenth century; the Gothic hospital church, containing a statue of our Saviour by Dannecker; and several other churches; the royal library (500,000 vols.); the museum and picture-gallery; the polytechnic school; a great building containing the exchange and concert-rooms, etc.; the theater, the town-house, and many other buildings. There are several high-class educational establishments, the polytechnic being the chief. Stuttgart is the chief center in South Germany for the book-trade, connected with which are paper-mills, type-foundries, printing-presses, and lithographic establishments. The other leading manufactures include dyes, chemicals, woolen and cotton goods, various fancy articles, jewelry, musical instruments, mathematical and scientific instruments, liqueurs, confectionery, and beer. Stuttgart dates from 1228, and in 1320 became the residence

of the counts of Würtemberg. From 1436 to 1482 it was much improved and enlarged, and has since, with only a short interval, been the capital. Eastward from Stuttgart, and almost connected with it by the royal palace grounds, is the town of Cannstatt. Pop. (1910) 285,589.

Stuyvesant (stī've-sant), PETER, born in Holland in 1602; in 1647 was made director-general of the Dutch colony of the New Netherlands, a position he held until 1664, when the colony fell into the hands of the English and became known as New York. His administration was vigorous and rather arbitrary, the result being that the people refused to support him in his resistance to the English. Stuyvesant went to Holland the next year, but soon returned, and passed the rest of his life at his farm called the Bouwerij, from which the present Bowery in the city of New York has its name. He died in 1682.

Stye (stī; known also as *hordeŏlum*), a little boil on the margin of the eyelid, which commences in the follicle of one eyelash. Styes are most common in young people, especially in anæmic girls, and are mostly associated with some obvious derangement of the general health, which should be made the subject of treatment. The tumor generally bursts in a few days, and it is very seldom necessary to puncture it. Warm-water dressings with lint and oiled silk should be applied.

Style (stīl), in botany, the prolongation of the summit of the ovary which supports the stigma. Sometimes it is entirely wanting, and then the stigma is *sessile*, as in the poppy and tulip. When the ovary is composed of a single carpel, the style is also single, and the number of styles varies according to the number of carpels, though when the carpels are numerous the styles may be united.

a, Style; *b*, stigma.

Style, OLD and NEW. See *Calendar*.

Stylites (stī'līts), or PILLAR SAINTS (from the Greek *stylos*, column; in Latin, *sancti columnares*), a class of Christian saints, who, by way of penance, passed the greater part of their lives on the top of high columns. This method of self-torture was introduced by Simeon the Stylite (St. Simeon Stylītēs), a Syrian monk who lived in the open air near Antioch, on the top of a column 40 cubits high and only 3 feet in diameter at the top. Here he remained for many years, till his death in 459 or 460. It appears, however, that he must have descended at times, since he cured the sick by his touch, and performed sundry other miracles, wrote epistles, and took part in political quarrels. His example was imitated by many persons in Syria and Palestine, and the mania continued until the twelfth century.

Stylobate (stī'lu-bāt), in architecture, generally, any sort of basement upon which columns are placed to raise them above the level of the ground or floor; but, technically, a continuous unbroken pedestal upon which an entire range of columns stands, contradistinguished from *pedestals*, which are merely detached fragments of a stylobate placed beneath each column.

Stylops (stī'lops). See *Strepsiptera*.

Styptic (stip'tik), a remedy that has the virtue of clotting blood, or of closing the aperture of a wounded vessel. Oak bark decoction, gall-nuts in powder or infusion, matico, and turpentine, are styptics derived from the vegetable kingdom; and from the mineral are derived salts of iron, the sulphates of copper and zinc, the acetate of lead and the nitrate of silver.

Styraceæ (stī-rā'se-ē) STYRACA'CÆ, a small nat. order of plants belonging to the polycarpous group of monopetalous exogens. The species are trees or shrubs with alternate leaves without stipules. The flowers are usually axillary, and are either solitary or clustered, with membranaceous bracts; the fruit is a drupe, the seeds few or solitary. The species are chiefly found in the temperate and tropical parts of North and South America, and also in Asia and Africa. The order is chiefly remarkable for furnishing the storax and benzoin of commerce. Some of the species are used for dyeing yellow. The order includes the snowdrop-tree of North America (*Halesia tetraptera*).

Styrax (stī'raks), a genus of plants, nat. order Styraceæ, of which it is the type. The species are elegant trees and shrubs, with entire leaves and white or cream-colored racemose flowers. They are principally natives of America and Asia; one is found in Europe, and one in Africa. *S. officinālis*, also called storax, is a native of Syria, Italy, and most parts of the Levant. It yields the storax of commerce (which see). *S. Benzoin* (gum-benjamin tree) is a native of Sumatra and Java. It yields the

gum benzoin of commerce. (See *Benzoin.*) The hardy species of *Styrax* are well adapted for shrubberies, on account of their foliage and handsome flowers.

Styria (stir'i-à; German, *Steiermark*), a duchy of Austria, bounded by Upper and Lower Austria, Hungary, Croatia, Carniola, Carinthia, and Salzburg; area, 8670 square miles. The whole duchy, with the exception of the southern part, is mountainous. The Noric Alps traverse the district between the Enns and the Mur; the Styrian Alps between the Mur and the Drave; and the Carnic Alps between the Drave and the Save. These mountains rise to a height of between 7000 and 8000 feet, and are rich in minerals. Styria belongs to the basin of the Danube, which drains it by means of the four rivers mentioned above. On the southern plains and in the valleys the land is fertile, and wheat, maize, hemp, flax, and the poppy are raised. The vine thrives well in many districts. The chief sources of wealth are the forests and minerals, dairy-farming, mining, and manufactures. Gratz is the capital. Pop. 1,356,058, the majority of whom are of German descent.

Styx (stiks), in Greek and Roman mythology, the name of a river of the infernal regions. Styx was also a rivulet in Arcadia, whose water was considered poisonous.

Suabia, or SWABIA (swā'bi-a; German, *Schwaben*), an ancient German duchy which, after bearing the name of Alemannia, from its original inhabitants, the Alemanni, changed it to Suevia or Schwabenland, in consequence of the incursion of the Suevi. On the division of the kingdom of the Franks in 843, Suabia, along with Bavaria, became as it were the nucleus of Germany, and its rulers continued for many centuries to hold a prominent place in its history. In 1376 was formed, chiefly by the union of its towns, the celebrated Suabian League. From 1512 to 1806 Suabia formed one of the ten circles into which the German Empire was divided. It is now divided between Würtemberg, Baden, Bavaria, Hohenzollern, and Lichtenstein. The name of Suabia is given to a division of Bavaria; area, 3730 square miles; pop. 713,681. Augsburg is its capital.

Suaheli (swä-hē'li), a name given to the inhabitants of the Zanzibar coast of East Africa and the adjacent islands, a people of mixed Arabic and native African origin. They form the most important part of the subjects of the Sultan of Zanzibar, and their language is the common medium of communication in East Africa.

Suakin (swä'kēn), or SAUÂKIN, a seaport of Nubia, on the west coast of the Red Sea. The principal part of the town lies on a small rocky island, but there is also a portion (El Kaff) surrounded by fortifications on the mainland. The Mahdist rising in the Soudan almost completely de-

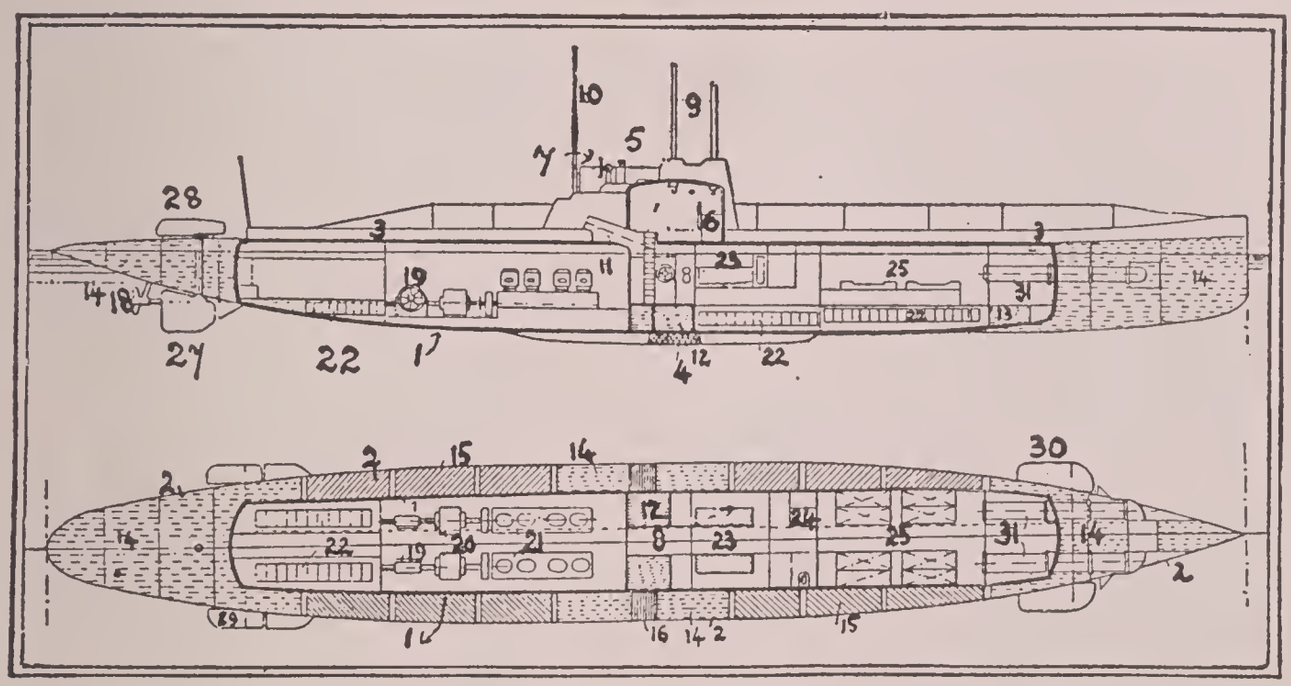
stroyed the trade of Suakin, but this has since revived, gums, ivory and tobacco being exported. It is a station for pilgrims bound for Mecca, and has a population of about 12,000.

Suarez (swä'reth), FRANCIS, one of the most eminent scholastic and polemic writers of the Roman Catholic Church, was born at Granada in 1548; died at Lisbon in 1617. He entered the society of Jesuits in 1564, and soon became professor in succession at Valladolid, Rome, Alcalá, and Salamanca. In 1597 Philip II appointed him principal professor of divinity at the University of Coïmbra, a position he held until his death. The most recent edition of his works, in twenty-eight vols., 4to, was completed in Paris in 1860.

Subiaco (sö-bē'ä-kō; ancient, *Sablaqueum*), a town of Italy, in the province of Rome, on a height near the right bank of the Teverone, 34 miles east of Rome. It has a fine old castle, formerly often occupied by the popes; remains of Nero's villa; and in the neighborhood interesting monasteries. Pop. 8003.

Sublimation (sub-li-mā'shun), a process by which solid substances are, by the aid of heat, converted into vapor, which is again condensed into the solid state by the application of cold.

Submarine Boats (sub-ma-rēn'), vessels built to descend into and move under water. While prior to the year 1773 many submarine boats were constructed, in that year the first designed for or used in actual warfare was built by David Bushnell. The hull of this boat was only large enough for one man, who drove and steered it and caused it to descend or rise. A fore-and-aft shaft fitted with a screw propeller furnished the motive power. This could be operated by the hand or foot, and gave a speed of two to three knots ahead or astern. To submerge the vessel water was admitted by a valve, and was pumped out by a hand-worked force pump. The boat's magazine was two pieces of oak bolted together and designed to hold 150 pounds of gunpowder. It was detachable and fitted with a screw for attaching it to a ship's bottom. At one time the operator of this boat was able to get beneath the bottom of an English man-of-war off New London, but was prevented from blowing her up by his inability to drive the attaching screw through her copper sheathing. Late in the eighteenth and early in the nineteenth century Robert Fulton built several submarines, the latest of which was 80½ ft. long. This boat was driven by steam engines. Between that time and 1902, when the United States acquired a



SUBMARINE BOAT

1, inner hull; 2, outer hull; 3, deck; 4, bottom hatch for mine planting; 5, deck control station; 6, inner conning tower; 7, deck wheel and binnacle; 8, central hatchway; 9, periscopes; 10, mast; 11, engine room; 12, compressed air tanks; 13, fresh water tank; 14, water ballast in outer hull; 15, fuel oil storage; 16, lubricating oil storage; 18, propellers; 19, reversing gear; 20, motor-generators; 21, Diesel engines; 22, electric storage batteries; 23, officers' quarters; 24, galley; 25, crew's quarters; 27, 28, rudders; 29, 30, hydroplanes or diving rudders; 31, twin torpedo tubes.

Holland submarine, many experiments were carried out in submarine naval construction. During the Civil war the Confederates had a craft which had no freeboard and which succeeded in blowing up the U. S. S. *Housatonic* with a spar torpedo, but foundered with all on board. The first Holland boats used by the United States navy include the following points of interest: Length, 63.3 ft.; beam, 11.75 ft.; displacement, 120 tons submerged. They were fitted with storage batteries and electric motors for submerged running, and gasoline engines for surface running, which also operated in charging the batteries. The surface and submerged speeds were 9 and 6.5 knots, respectively, and the surface radius 400 miles. The boats in present use (1916) are of several different types. They are divided into a class called fleet submarines of about 1500 tons, with a surface speed of not less than 20 knots, and coast submarines of 600 tons and slower speed. In these craft the torpedo tubes have an automatic loading device. Their armament consists of a 3-inch gun, a machine gun and an anti-aeroplane gun; they are equipped with gyroscope compasses; are fitted for submerged and surface signaling, and have wireless outfits. While the submarine service of the navy has been, on the whole, remarkably free from fatal accidents, that such accidents are always possible was demonstrated by the sinking of the Holland boat F-4, which went down in 300 feet of water outside of Honolulu harbor, March 25, 1915, with a crew of 21 men. In the later type of submarine construction the Diesel engine (*q. v.*) has been installed, and gasoline, which has been the cause of many accidents aboard these vessels, has been displaced by heavy oil as fuel. The horsepower of these engines, depending on the type of craft, is from 1200 to 6500; the electric motors for submerged running are of a maximum of 2400 horsepower, capable of producing speeds of 24 and 18 knots, and with a radius of 2800 and 2900 miles. These craft carry an armament of eight 21-inch torpedo tubes and two 4-inch guns on disappearing mounts. The crew is made up of 3 executive officers, 2 engineer officers, a surgeon and 46 men.

The part played by the submarine in the European war has been one of considerable prominence. It has been carried on mostly by the English and German navies, the German fleet having shown itself particularly destructive. In February, 1915, Germany declared the existence of a war zone around the British Isles and began a systematic war of destruction by submarines on merchant shipping. Thousands of ships were torpedoed, with great loss of life. The most atrocious example of this sort of warfare was the sinking by a German submarine, on May 7, 1915, of the *Lusitania*, over 1100 persons being drowned.

Important appliances of the submarine are the periscope, the instrument by which those in the underwater vessel can see what is going on above the water; the Fessenden oscillator, a sounding apparatus by which signals can be sent through the water for 100 miles; the microphone, which registers sounds and enables the listeners in the submarine to hear the approach of a ship five miles away; and the multiple pump, by means of which the submarine can remain practically motionless under water at any desired depth. Camouflage (*q. v.*) was applied to the hulls of ships, the bizarre colors blending with the ocean and making the vessels less liable to detection. To counteract this device, later submarine periscopes were fitted with ray filters, which were said to destroy the effect of the camouflage.

An attempt was made by Germany during the war to carry on her trans-oceanic trade by means of submarine, and the cargo undersea boat, *Deutschland*, made two trips to America in 1916. After the United States entered the war, in April, 1917, great but scarcely successful efforts were made by the enemy to stop the flow of troops to Europe. The *Tuscania*, carrying 2179 United States troops, was torpedoed February 5, 1918, off Ireland, with a loss of 113 American soldiers. In June, 1918, Germany carried her submarine offensive directly to the United States by sinking a number of small unarmed ships off the North Atlantic coast.

Submarine Cable, a rope of wires and insulating materials laid along the bed of a sea or ocean through which telegraphic messages are transmitted. The conducting portion of such cables consists of a number of pure copper wires twisted into a strand which is covered with alternate coatings of a pitchy mixture and gutta-percha. This core is then covered with Manila yarn and twisted iron wires. The first attempt to lay a submarine cable was made in 1850, between Dover and Calais, but the cable only lasted a few hours owing to friction against the rocks. However, electric communication across the channel was reëstablished not long after. The first Atlantic cable, from Ire-

Submarine Cable.

land to Newfoundland, was successfully laid by the *Great Eastern* in 1866, after unsuccessful attempts in 1857, 1858 and 1865. Long submarine cables now connect nearly all parts of the world. Signals through the cables are generally recorded by Thompson's mirror galvanometer and also by his siphon recorder, which enables the transmission of messages to be carried on with great rapidity. There were, in 1912, over 400 cables in use, with a total length of more than 200,000 miles. See *Telegraph, Electric.*

Submarine Forests, a term applied to beds of impure peat, consisting of roots, stems, and branches of trees, etc., occupying the sites on which they grew, but which by change of level are now submerged by the sea. Such submarine forests do not contain any trees that are not found growing at the present time.

Submarine Mines, explosives placed under water in a harbor, or along the coast, to destroy the vessels of an enemy. They have been long used, and were employed effectively by the Germans in the war of 1870. The Spanish-American war demonstrated the inefficiency of torpedoes and torpedo boats against rapid-fire guns, but the submarine mines were a source of constant dread to the battleships. In 1904, the destruction of the Russian battleship, *Petropavlosk*, also of the Japanese ships *Hatsuse* and *Yoshino*, by submarine mines, and the indiscriminate scattering of mines in the Gulf of Pe-chi-li, were features of the war. Mines were also widely used in the European war.

Subornation of Perjury, the crime of inducing a person to commit perjury, punishable similarly to perjury. See *Perjury.*

Subpœna (sub-pē'na), in law, is a writ commanding a witness to appear in court, or render himself liable to an action of damages. When he is required to bring books or papers in his possession a clause is inserted to that effect, and the writ is then called a *subpœna duces tecum* ('bring with you under penalty'). A witness is allowed his traveling expenses.

Subsidy (sub'si-di), a term once used to denote the pecuniary assistance afforded, according to treaty, by one government to another, sometimes to secure its neutrality, but more frequently in consideration of its furnishing a certain number of troops. *Subsidy,* in England, was formerly an aid or tax granted to the crown. It now signifies a sum paid by a government to aid corporate or individual enterprises.

Shipping Subsidies are government grants in aid of shipping and may be applied to any of the following objects: bounties for the construction of ships and their navigation; payments on contracts for carrying the mails; payments to shippers who contract to observe specified constructive details in shipbuilding and hold their ships in readiness to act as auxiliary naval vessels in time of war. In the United States the first postal subvention was authorized by an act of Congress, March 3, 1845. This law, with various changes, has been re-enacted from time to time. In 1891 a law was passed empowering the Postmaster-General to make contracts with American ship owners for carrying the mails. The maximum rate is $4, $2, $1, and 60 cents per mile for the four classes of ships specified in the contract. Where mileage rates are not paid the compensation to American steamers is $1.60 per pound of letters and post cards; for the same service foreign ships receive 44 cents. Bills for granting general subsidies are almost continuously before Congress. But concerted action looking toward the relief of American shipping cannot be said to have been brought.

Substance (sub'stans), in a philosophical sense, is contradistinguished from *accident*, and signifies that which exists independently and unchangeably; while accident denotes the changeable phenomena in substance, whether these phenomena are necessary or casual, in which latter case they are called accidents in a narrower sense. Substance is, with respect to the mind, a merely logical distinction from its attributes. We can never imagine it, but are compelled to assume it.

Subularia (sub-ū-lā'ri-a), a genus of plants, nat. order Cruciferæ, found in the gravelly bottoms of lakes, usually in shallow water, in North and Central Europe, North Asia, and the Northern United States. *S. aquatica*, or awlwort, the only species, consists merely of a tuft of white fibrous roots, narrow awl-shaped leaves, and a leafless stalk, bearing a few small white flowers. It is indigenous to Scotland and the north of England and Ireland.

Subway (sub'wā), a tunnel cut or built for various purposes beneath the public streets of a large town. In order to relieve the overcrowded condition of the London streets the construction of an underground railway was suggested, and in 1855 a company was formed for this purpose. After overcoming many engineering difficulties the work was successfully com

pleted, and in January, 1863, the first underground railway was opened to the public. London is now abundantly supplied with subways and in the United States there are a number of notable examples, the most important of these being those constructed in New York City, in connection with elevated systems. The Interborough subway roads total 250 miles. Boston, Philadelphia, Chicago and St. Louis are also well supplied. Subways are frequently built in connection with trunk-line railroads, as well as for the relieving of the congested traffic of the streets. A striking example is the one opened in 1910 by the Pennsylvania R. R. which runs under the city of New York and its two river boundaries. Subways are constructed either of concrete arches, as in Paris, or steel-and-concrete construction, known as box or cellular sections, which is shown in the opposite illustration. The cost of subway construction is great on account of the many difficulties encountered in the coursee of the underground work in large cities. The most important is the problem presented by the sewer system, extensive reconstruction of the sewers being necessitated, and new main drainage lines and outfall demanded. Electricity is the motive power in the subways, thus avoiding smoke, dust and other accompanying discomforts of steam. The system used in American subways employs the direct current at about 600 volts potential, supplied by a third rail supported on insulators just above ground alongside the track, the return going through the track rails. See also *Tunnel*, *Railroad*, etc.

Succession (suk-sesh'un), PRESIDENTIAL, in the United States. A succession bill was passed in Congress, January 15, 1886; signed by President Cleveland January 19 of that year. Under its provisions, in case of the death of the Vice-President, the Secretary of State stands next as successor to the presidency, followed by the Secretary of the Treasury, the Secretary of War, the Attorney-General, the Postmaster-General, the Secretary of the Navy, and the Secretary of the Interior in turn.

Succession Wars, wars which have arisen from claims for the possession of the crown on the occasion of a sovereign dying without undisputed legal heirs. In modern European history the most important of these struggles were those of the *Spanish succession* (1700-13), and of the *Austrian succession* (1740-48). Shortly before the death of Charles II of Spain, without issue or collateral male heirs, several competitors laid claim to the throne, the two principal being the dauphin of France, son of Charles' eldest sister, and the Emperor Leopold of Austria, who claimed, in right of his mother, Mary Ann, daughter of Philip III of Spain. The other powers were greatly interested in this question, since the union of either France or Austria with Spain would have endangered the balance of power in Europe. After much negotiation Philip of Anjou was put forward by Louis XIV to represent the French claim, and Leopold nominated his second son, Charles, as his substitute, both parties declaring that Spain should never be incorporated with their respective dominions. The king of Spain eventually recognized Philip as his heir, and on the king's death, in November, 1700, Philip was proclaimed at Madrid. He was recognized by most of the European powers except Austria, which in 1701 began a war against France; and the arrogant and aggressive behavior of Louis, and his recognition of the son of James II as king of England, caused England, Holland, and Austria to combine against him and Philip in 1702. Prince Eugene of Austria had already opened the contest in 1701, and had defeated the French at Carpi (July) and at Chiari (September). In 1702-03 Marlborough, at the head of an allied Anglo-Dutch-Germany army, reduced the French strongholds along the Meuse and in the Low Countries. In 1704 Marlborough and Eugene joined their forces and defeated the Franco-Bavarian army at Blenheim (August 13). Barcelona was captured by an English force in 1705, and the Earl of Peterborough gained some brilliant successes in this quarter. On May 23, 1706, the French were defeated by Marlborough at Ramilies, and again at Turin by the Austrians in September. In April, 1707, a Franco-Spanish force under the Duke of Berwick routed an Anglo-Portuguese army at Almanza, Spain. In the following year Marlborough and Eugene reunited their forces and severely defeated the French at Oudenarde (July 11). The resources of France were now almost crippled, and Louis made overtures of peace which were rejected. The struggle was renewed with great vigor; Villars, with a French army of nearly 100,000 men, proceeded against Marlborough and Eugene, but he was defeated by the allies at Malplaquet on Sept. 11, 1709. In Spain the French had entirely gained the upper hand by next year. The war dragged on until the accession in 1711 of the Archduke Charles to the Austrian throne changed the whole aspect of affairs, and the

war, so far as Britain, France, and Holland were concerned, was brought to an end by the Peace of Utrecht in 1713. Peace between Britain and Spain soon followed, Britain gaining Gibraltar (taken in 1704 by Admiral Rooke) and Minorca. In the end the Emperor Charles, forsaken by his allies, was reluctantly compelled to sign a treaty at Baden on September 7, 1714, recognizing Philip V as the king of Spain. See *Utrecht, Peace of.*

The war of the Austrian succession arose on the extinction of the male line of the house of Hapsburg, by the death of the emperor Charles VI, October 20, 1740. By diplomatic negotiations before his death, and by means of the settlement called the Pragmatic Sanction (which see), Charles had endeavored to secure the Austrian succession for his daughter, Maria Theresa. But there were several other claimants for the Austrian possessions, which included Bohemia, Hungary, Northern Italy, part of the Netherlands, and Austria proper. Besides Maria Theresa, the other claimants of importance were Charles Albert, elector of Bavaria, and Philip V of Spain; while the chief European powers which took an interest in the succession were France, Prussia, and England. The first movement in the general scramble was made by Frederick II of Prussia, who, in Dec., 1840, marched his army into Silesia, and secured the four duchies in that province as his share of the spoil. In the following year an agreement was entered into between France, Spain, Bavaria, Prussia, Saxony, Sardinia, and Naples, in terms of which a French-Bavarian army entered Upper Austria, another French army invaded the Austrian possessions in the Netherlands, and the forces of Spain and Naples occupied the Austrian territory in Northern Italy. This having been done, the coalition arranged that Charles Albert should be crowned (January, 1742) as Emperor of Germany under the title of Charles VII, and this was accomplished at Frankfort. Meanwhile Maria Theresa appealed for help to the Hungarian diet at Presburg with such effect that the Magyar horsemen promptly invaded Bavaria and captured the city of Munich. She also formed an alliance with England, in accordance with which the English government furnished her with money, sent a fleet to Naples to demand the withdrawal of Neapolitan troops from Austrian territory, and supplied a portion of the army which, under George II, defeated the French forces at Dettingen (1743).

After this event negotiations for peace were begun, but with so little success that another league was formed including England, Holland, Austria, Saxony, and Sardinia, and a general European war broke out. Among the more important events of this general conflict were the second Silesian war, begun by Frederick II; an attempted invasion of England by France in favor of the Pretender; and the brilliant campaign in the Netherlands conducted by Marshal Saxe, and terminating (May, 1745) in the victory of Fontenoy, where the English and allies under the Duke of Cumberland were defeated. In 1745, however, the Emperor Charles VII died, and his son, Maximilian Joseph, gave up all claim to the Austrian throne, and concluded peace with that country; and in the same year the husband of Maria Theresa was elected emperor under the name of Francis I. (See *Maria Theresa.*) War was still continued against Austria by Frederick II of Prussia and the French forces under Marshal Saxe, but ultimately a definite treaty of peace between all the powers was signed in 1748 at Aix-la-Chapelle. See also *Frederick II, Prussia, Austria,* etc.

Succinic Acid (sŭk-sin′ik; $C_4H_6O_4$), an acid obtained by the dry distillation of amber. Succinic acid also occurs in certain lignites, and is found in the turpentine of several species of pine, and in certain plants. It is also occasionally found in the animal organism,

Suchet (su-shā), Louis Gabriel, Duke of Albufera, Marshal of France, born at Lyons in 1770, entered the military service at an early age (1790), and served with distinction under Napoleon, Masséna, Joubert, and Moreau in the Italian and Swiss campaigns. He attained the rank of lieutenant-general before he was thirty, and in 1808 he received the command of a division in Spain, and was almost constantly victorious till after the battle of Vittoria. His brilliant services in that country obtained him the marshal's staff, and the title of duke. After the restoration Suchet was created peer of France. He lost his peerage after the battle of Waterloo, but recovered it in 1819. He died in 1826.

Suchow, or Soochow (literally the Soo district), a city of Kiangsu, China, on the Grand Canal, 80 miles west of Shanghai. It is a city of many canals and has long been noted for its wealth and luxury. It has many industries, silks and satins ranking first.

Here is the largest pagoda in the world, the Pahz Ztah. Soochow University is maintained by the Methodist Episcopal Church South. Pop. (1920) 1,027,091.

Sucker, a North American fresh-water fish of the genus *Catostomus*, having the mouth usually protractile, and the lips thick and fleshy, adapted for sucking in food (plants and small animals) from the mud at the bottom of the rivers and bayous which they inhabit. Some of the species are the common or white sucker (*C. teres*), the northern or red sucker (*C. catostumus*), etc.

Suckling (suk'ling), Sir John, a wit, courtier, and dramatist, born in 1609, at Whitton, in Middlesex, and was educated at Trinity College, Cambridge. In 1631-32 he served as a volunteer under Gustavus Adolphus. In 1639 he equipped a troop of horse for the service of Charles I against the Scotch. Being implicated in a plot to rescue the Earl of Strafford from the Tower he was obliged to flee to France, where he is said to have committed suicide about 1641. His writings consist of letters written with ease and spirit; some miscellaneous poems, including ballads and songs, which for grace and elegance of style are inimitable; a prose treatise entitled *An Account of Religion by Reason;* and several plays —*Aglaura*, *The Goblins*, *Brennoralt*— which were probably the first plays produced with stage scenery on an elaborate scale.

Sucre (soo'krā), the official capital of the Republic of Bolivia, in the department of Chuquisaca, on a plateau of the eastern Cordillera of the Andes, 9328 feet above the sea. Although Sucre is the official capital, La Paz is the actual seat of government. Pop. (1920) 30,000.

Sucre (sö'krā), Antonio Jose de, Spanish American patriot, was born in 1793 at Cumana in Venezuela. He engaged in the rising against Spain in 1811, attained the rank of brigadier-general in 1819, and in 1822 won the decisive victory of Pichincha, freeing Ecuador, and in 1824 drove the Spanish forces out of upper Peru. He became the first President of Bolivia, 1826. In 1828 he was driven from the country during an insurrection, but returned and reinstated himself. He was assassinated in June, 1830.

Sudan. See *Soudan*.

Sudbury (sud'bu-ri), county town of Sudbury district, Ontario, on main line of Canadian Pacific and Canadian National railways. It is the center of the nickel district. There are smelters, planing mills, foundry and machine shops, flour mills, and manufactures of cement blocks, candy, soda water, etc. Pop. (1911) 4150; (1921) 8621.

Sudbury (sud'bu-ri), a municipal borough of England, in the county of Suffolk, 22 miles west of Ipswich, on the left bank of the Stour. Pop. (1911) 7141; (1921) 7046.

Sudermann (zōō'dĕrmän), Herman, a German playwright and novelist, born at Matzicken in East Prussia, December 9, 1857. He studied at Königsberg and Berlin, and devoted himself to a literary career in the capital. He first gained recognition by his social drama, *Die Ehre* (Honor), 1889. His best-known plays are *Heimat*, translated as *Magda* (1893); *Johannes* (1897), dealing with John the Baptist; *Johannisfeuer* (1901), presented in America as *The Fires of St. John;* and *Es lebe das Leben* (1902), translated as *The Joy of Living*. During the war (1916) he wrote *The World Made Godless*.

Sudetes (sö-det'es), or Sudetic Mountains, a mountain chain of Europe which separates Silesia from Czecho-Slovakia. Highest peak is Schneekoppe, 5300 feet above the sea. They are rich in coal, iron, zinc and other minerals.

Sue (sü), Marie-Joseph-Eugène, a French novelist, born at Paris in 1804. He adopted his father's profession of medicine, became a surgeon in the army, and served in Spain in 1823. In 1825 he joined the naval service, and in the capacity of surgeon, was present at the battle of Navarino in 1827. On his father's death in 1829 he inherited an immense fortune, and, having abandoned his profession, he devoted himself to literary composition. His most famous works are *Les Mystères de Paris* and *Le Juif Errant*, well known in English as *The Mysteries of Paris* and *The Wandering Jew*. In 1850 he was elected to the Constituent Assembly, and sat as an advanced radical. After the *coup d'état* by Napoleon III, in 1851, he left France and retired to Annecy, where he died in 1857.

Sueca (su-ā'kä), a prosperous and well-built town of Spain, on the left bank of the Jucar, 23 miles south of Valencia, a few miles from the Mediterranean, by the Sierra de Cullera. Pop. 20,000.

Suet (sū'et), the fatty tissue situated about the loins and kidneys of certain domestic animals, especially the ox and sheep, and which is harder and less fusible than the fat from other parts of the same animals. Beef-suet

is much used for culinary purposes, and purified mutton-suet forms an ingredient in ointments, cerates, and plasters.

Suetonius (swē-tō′ni-us), CAIUS SUETONIUS TRANQUILLUS, a Roman writer, the son of a military tribune, flourished about 100 A.D. Little is known of the circumstances of his life. He distinguished himself as an advocate, and enjoyed the patronage of the younger Pliny. He became secretary (*magister epistolarum*) to the Emperor Hadrian, but was dismissed on account of his intimacy with the Empress Sabina. His chief work, *Vitæ Duodecim Cæsarum* ('Lives of the Twelve Cæsars'), gives an interesting account of the private life and personal character of the twelve first Roman emperors from Julius Cæsar to Domitian, and is of great value to us from the light which it throws on domestic manners and customs.

Sueur, LE. See *Lesueur.*

Suevi (swē′vī), the general name of a number of united tribes who, before the Christian era, inhabited parts of Germany. The confederation included the Marcomanni and the Semnones, the former inhabiting what is now Bohemia, and the latter the present Lusatia and Brandenburg. The Suevi of Cæsar lived between the Rhine and the Weser. In the great migration of the northern nations, the Suevi joined the Alans, entered Gaul, and in 409 Spain. After the Vandals had gone to Africa the Suevi spread as far as Portugal. They were overcome and absorbed by the Visigoths in 586. Those of them who remained in Germany were the ancestors of the present Suabians.

Su′ez, a town of Egypt, situated at the Red Sea terminus of the Suez Canal, 76 miles E. of Cairo, with which it is connected by rail. Previous to the construction of the Suez Canal, and the fresh-water canal from the Nile (see next article), it was an ill-built and miserable place, but is now in a fairly flourishing condition. Among the principal buildings are the Greek church, viceroy's villa, two hospitals, custom-house, etc. Pop. 18,347.

Suez Canal (sö-ez′, sö′ez), the great ship-canal without locks now connecting the Mediterranean with the Red Sea; running from Port Saïd on the former to Suez on the latter, a distance of nearly 100 miles. According to Herodotus, a large canal from the Red Sea to the Nile was constructed about 600 B.C. This canal, which seems never to have been of much use, was finally blocked up about 767 A.D. Napoleon I had conceived the idea of making a ship-canal across the isthmus of Suez. In 1854 the French engineer M. Ferdinand de Lesseps obtained a concession for that purpose, and in 1858 was able to form a company for carrying on the work. Operations were begun on April 25, 1859, and on November 17, 1869, the canal was opened; the total cost of construction was nearly $80,000,000. There were 75 miles of actual excavation, the remaining 25 miles being through shallow lakes (Lake Menzaleh, Lake Timsah, Bitter Lakes), which usually had to be deepened. For about four-fifths of its length it was

originally 327 feet wide at the surface of the water, 72 at the bottom, and 26 deep; for the remainder only 196 feet wide at the top, the other dimensions being the same; but the increase of traffic led to its being widened and deepened. A canal was also constructed for bringing fresh water from the Nile at a point near Cairo. This canal reaches the salt-water canal at Ismailia, and then runs almost parallel to the ship-canal to Suez. It is almost 40 feet wide and 9 deep, and is used for navigation as well as for domestic purposes and irrigation. The land on both sides of the ship-canal is to be retained by the com-

pany for ninety-nine years. In November, 1875, the British government bought from the Viceroy of Egypt his interest in the canal, consisting of 176,602 shares, for the sum of £4,000,000. The shipping passing through the canal has steadily increased since its opening. About four-fifths of the tonnage passing through belongs to Britain. Navigation at night by aid of the electric light began on March 1, 1887, and has shortened the time of passage by about one-half, viz., to from sixteen to twenty hours. The distance between London and Bombay by the old route round the Cape is about 11,220 miles; by the canal route, 6332. Steamships are allowed to sail at a speed of five to six knots an hour.

Suffolk a city, county seat of Nansemond Co., Virginia, on the Nansemond River, 23 miles S. W. of Norfolk; the junction of six railroads. It has car shops, knitting-mills, packing plant, factories, etc., and has a large trade in peanuts. Pop. (1920) 9123.

Suffolk (suf'ok; literally south-folk), a maritime county of England, bounded by the North Sea, Essex, Norfolk, and Cambridgeshire. It has a coast-line of about 50 miles, and an area of 1455 square miles. The county is intersected by several rivers, chief among them being the Lark, a tributary of the Great Ouse; the Stour, and the Gipping. Most of the surface is level and agriculture is the main industry. Chief town, Ipswich. Lowestoft is the chief fishing town. Pop. 408,054.

Suffragan. See *Bishop.*

Suffrage (suf'rij), the right to vote for any purpose, but more especially the right of a person to vote in the election of his political representative. Many writers advocate the universal extension of this right, but in Britain and most European countries it is limited by a household or other qualification. In the United States it is with few exceptions exercised by all citizens of twenty-one years and upwards. Among ate laws on the subject these may be mentioned: Idaho prevents polygamists from voting; in Maine and Massachusetts the voter must be able to read the State constitution in the English language, write his name, and must not be 'a pauper or under guardianship.' Mississippi in its State constitution has an educational test for suffrage. In Wyoming it is a crime to discharge an employé because he has been nominated for an office. California has made it penal to enclose wages in pay envelopes on which any political arguments or the names of party candidates are printed. Efforts for many years have been made by women to gain the privilege of suffrage, with the result that complete woman suffrage has been gained in many countries. New Zealand adopted the principle of woman suffrage in 1893; the states that now compose the commonwealth of Australia, 1895-1902; Norway, 1907; Sweden, 1909; Denmark, 1915; Great Britain, Germany, Austria, Hungary, Russia, Czechoslovakia, Holland, and some other European countries and South Africa, 1918-19; the United States, by amendment to the constitution in 1920. See *Women's Rights.*

Sufism (sö'fizm), the pantheistic mysticism of the Mohammedan East, which strives for the highest illumination of the mind, the most perfect calmness of the soul, and the union of it with God by an ascetic life and the subjugation of the appetites. This pantheism, clothed in a mystico-religious garb, has been professed since the ninth and tenth centuries by a sect which at present is gaining adherents continually among the more cultivated Mohammedans, particularly in Persia and India. The name is from *sufi*, a religious ascetic, an Eastern term applied to all members of religious monastic bodies leading an ascetic life. The Sufis were originally devout persons who, perplexed by the discord prevailing among the various systems of Mohammedan philosophy in the second century of the Hejira, found consolation in pious mysticism. Their teachings though at first consonant with orthodox Mohammedanism, gradually led to a mode of thought totally irreconcilable with the Koran. About the beginning of the tenth century the Sufis divided into two branches, one of which followed Bostanie, who openly embraced pantheism, and the other Juneid, who sought to reconcile Sufism with Mohammedanism. Among eminent Persian poets belonging to the Sufis we may mention Hafiz, a distinguished Sufi; Ferîd-ed-dîn, Rumi, and Jami. The celebrated philosopher and jurist Alghazzâlî was also a Sufi.

Sugar (shug'ar), a name applied to various compounds of carbon, hydrogen, and oxygen, all of which have a more or less sweet taste, a neutral reaction to vegetable colors, and are soluble in water. The sugars are generally of vegetable origin; they are mostly crystallizable, and when in solution they rotate the plane of a ray of polarized light. Among all these compounds the sugar of the sugar-cane and beet is

distinguished *par excellence* by the name sugar. It is supposed that sugar was first cultivated in India, but a knowledge of the sugar-cane and its method of cultivation was brought from Persia by the Arabs, and given by them to Europe. The Spaniards were the first to plant it in Madeira (1490), from whence it spread to their possessions in the West Indies and South America; while during the middle ages Venice was the emporium of the trade in sugar. There is a record that so early as 1319 it was shipped from the latter port to London. It was, however, chiefly used as medicine until the beginning of the last century, when it became a food staple in connection with tea and coffee.

Sugar is principally prepared from the sugar-cane and from beet. (See *Sugar-cane* and *Beet.*) The first operation in the manufacture of sugar from sugar-cane consists in pressing the juice from the canes. For this purpose the canes are passed under large rollers, which extract about 70 to 90 per cent. of the juice. The cane juice is now boiled in copper vessels; milk of lime, sulphurous acid, or phosphoric acid is added to neutralize the vegetable acids (malic, etc.), and at length the sugar crystallizes. The liquid portion remaining is drained off and sold as molasses. The raw sugar is then usually shipped to importing countries, where it is refined. In obtaining the juice from beet-root two methods have been adopted. In one of these the roots are placed in a cylinder, where they are mashed to a pulp by rows of saw-toothed blades driven with great rapidity, after which the juice is pressed out by means of a hydraulic press; in the other process the roots are placed in a series of cylinders through which water is forced until the saccharine matter in the roots has all been obtained. By this process as much as 90 per cent. of the juice is extracted. When this is accomplished the expressed juice is heated to about 70° C., milk of lime is added, and the temperature increased; the lime separates the impurities in the form of phosphates and albuminates of calcium, etc., which cover the surface with a white crust. When the boiling juice breaks through the crust the liquid is run off and cleared of the lime by carbonic acid. The syrup is then twice filtered, and allowed to crystallize.

The sugar-cane contains about 18 per cent., and the beet 11.2 per cent. of sugar. The first process of refinement is to dissolve the raw sugar in water to which a little lime is added; this solution is heated by steam and passed through filters, generally consisting of deep vats, the bottoms of which are perforated and covered with a thick layer of animal charcoal. The syrup is then collected underneath and boiled down to induce crystallization. The latter operation is conducted in vacuum-pans connected with an air-pipe, a condenser, and a pipe to admit steam. The juice being in the pan, a partial vacuum is produced by means of the air-pump, and steam circulates through a coiled pipe in the pan until the liquid boils, while the vapor thereby produced is removed and condensed. The sugar-syrup is then run out and allowed to crystallize in conical-shaped vessels of clay or sheet-iron; *papier-mâché* is also used. In these vessels the crystalline mass assumes its marketable form, from which it derives the name of *loaf-sugar*. After draining the sugar in the molds the juice is completely removed by a centrifugal machine; the sugar-loaf is then dried. From the syrup which drains off an inferior sugar is obtained, and the remaining uncrystallized syrup is sold as molasses. *Sugar-candy* is prepared by boiling sugar-syrup with a little animal charcoal, clearing with white of egg, boiling down over an open fire, and crystallizing. Sugar-candy is known in commerce as *refined-white*, which forms large colorless crystals, and is prepared from refined cane-sugar; *yellow-candy*, forming straw-colored crystals, prepared from boiled sugar; and *brown-candy*, similar in color to ordinary moist sugar, and prepared from inferior cane-sugar. Sugar-candy is largely used for making liqueurs, sweetening champagne, etc. Sugar is also produced extensively in the United States from the rock or sugar maple, in Asia from various species of palms, and in some countries from species of Guinea-corn or sorghum.

The common sugars have the general name of *cane-sugar*, and the chemical formula $C_{12}H_{22}O_{11}$, which is also the formula for several other sugars, all called *saccharoses*. Another form of sugar, called *grape-sugar* or *dextrose* ($C_6H_{12}O_6$), is the type of sugars called *glucoses*, and is manufactured chiefly for the use of brewers and wine-makers; it is also known as *honey-sugar*, *fruit-sugar*, *starch-sugar*, etc. It occurs in many natural fruits, such as the peach, plum, currant, apple, and grape, in quantities varying from 1.5 per cent. in the peach to 15 per cent. in the grape. It also forms the solid crystalline portion of honey. Grape-sugar may be obtained from grape-juice by heating it with marble, filtering, clearing with ox-blood, evaporating, and crystallizing. It is, however, generally prepared by boiling

starch with dilute sulphuric acid; the clear liquid is then run off from the precipitate, evaporated by steam, filtered through animal charcoal, and run into the crystallizing vessels. Dextrose or grape-sugar as well as cane-sugar belongs to the class of fermentable sugars. A certain number of other sugars, as mannite or manna-sugar, quercite or oak-sugar, etc., are *non-fermentable*. Cane-sugar crystallizes in large monoclinic prisms, which when broken exhibit phosphorescence. At 160° it melts to a clear liquid, which when cool and solidified is commonly known as *barley-sugar*.

The quantity of cane-sugar in a solution which contains no other substance may be estimated by simply estimating the specific gravity of the solution, but when other bodies are present it must be ascertained by other chemical processes or by means of the saccharometer, which is an instrument for determining the rotary power exercised by a solution of sugar upon a ray of polarized light. See *Saccharometer*.

Considerable quantities of sugar from the cane are produced in Louisiana, Hawaii and Porto Rico; but much the greater portion of the supply is obtained from Java and Cuba. A large quantity of beet-sugar has long been received from Germany, Austria, France, and Russia, in which countries a bounty is paid to the manufacturer when his sugar is exported, and he is protected from importation. Much is also produced in the United States, where the product is increasing with some rapidity. Of late years the West Indies have suffered greatly by the competition of bounty-encouraged beet-sugar produced on the continent of Europe.

Sugar-cane (*Saccharum officinārum*), a plant of the nat. order Gramineæ or grasses, from which great part of the sugar of commerce is obtained. It is nowhere found in a wild state, but is probably a native of tropical Asia. It grows to the height of 7 or 8 feet or more, and has broad ribbed leaves, and smooth shining stems. It is now cultivated in all the warm parts of the globe, such as the West Indies, Brazil, Java, Louisiana, etc., but varies in growth according to the situation, the season, or the weather. The sugar-cane flowers only after the lapse of an entire year, and a plantation lasts from six to ten years. The juice of the cane is so palatable and nutritive that during the sugar harvest every creature which partakes freely of it appears to derive health and vigor from its use. For the process of making sugar, as well as for other information regarding this product, see the preceding article.

Sugar-cane (*Saccharum officinārum*).

Sugar-mite (*Acārus sacchāri*), a species of mite frequently to be observed in raw sugar, very similar in appearance to the itch-mite.

Sugar of Lead, the common name for acetate of lead. See *Lead*.

Suhl (söl), a town of Prussia, prov. of Saxony, 30 miles s. w. of Erfurt. It is a mining center, and has manufactures of fire-arms; ironworks, machine-works, potteries and tanneries. Pop. 13,-814.

Suicide (sū'i-sīd), self-murder; the act of designedly destroying one's own life. To constitute suicide, in a legal sense, the person must be of years of discretion and of sound mind. See *Felo de se*.

Suidæ (sū'i-dē), the family of mammals of which the hog is the type. This family is characterized by having on each foot two large principal toes, shod with stout hoofs, and two short lateral toes which hardly touch the earth.

Characters of Suidæ.

a, Skull of Wild Boar. *b*, Teeth of the upper jaw. *c*, Teeth of lower jaw. *d*, Foot. *e*, Bones of foot.

The canine teeth project from the mouth and curve upwards. The muzzle is terminated by a truncated snout, fitted for turning up the ground. The family includes the wild boar, the wart-hog, and the peccary.

Suidas (sū'i-das), a Greek grammarian, who must have lived about the eleventh or twelfth century after Christ. He wrote a *Lexicon* which forms a kind of cyclopædia and dictionary.

Suir, or SURE (shur), a river rising in the Slieve-Bloom Mountains, Tipperary, Ireland. It forms the boundary between Tipperary and the counties of Waterford and Kilkenny, and after a course of about 80 miles it flows into Waterford harbor. It passes the towns of Cahir, Clonmel, and Carrick, and is navigable by vessels of 500 tons to Waterford.

Sukkur (suk-kur'), a town of Bombay Presidency, India, situated on the right bank of the Indus opposite Rohri. It contains the usual public offices with a civil hospital, dispensary, and an Anglo-vernacular school. It has a considerable local and transit trade, but no special manufacturing industries. Pop. 31,316.

Suleiman Pasha (sö-lā-mân'), a Turkish general, born in Constantinople of poor parents in 1840. He entered the army at an early age and rapidly rose to the highest rank. In 1876 he was made general of a division, and on the outbreak of the Russo-Turkish war, he had chief command in Herzegovina. In October, 1877, he was appointed leader of the army of the Danube, but was recalled in February, 1878, and accused of high treason. He was tried and condemned to fifteen years' imprisonment in December of the same year, but was soon afterwards pardoned. He died in Constantinople April 15, 1883.

Suliman Mountains (sö-lē-mân'), a range on the borders of Afghanistan and British India. The highest summit, Takht-i-Suliman, or 'Suliman's Seat,' attains an elevation of more than 6000 feet (according to some estimates 11,000 or 12,000 feet). These mountains are covered with dense forests, and are generally considered the peculiar seat of the aboriginal Afghans.

Sulina (sö-lē'na), the middlemost of the three chief mouths of the Danube; it quits the Khedrile or most southerly branch, and opens into the Black Sea after an easterly course of over 50 miles. (See *Danube.*) It is used for transporting immense quantities of corn, chiefly for the British market. The passage over the bar at the mouth has been deepened by means of two piers at a cost of $500,000. A town and port (now free) at the mouth bears the same name. Pilots, fishermen, lightermen, etc., chiefly form the pop. of 5611.

Suliots (sö'li-ōtz), a mixed people of Albanian and Greek origin descended from Arnaout and Grecian shepherds, who, to escape the tyranny of the Turks in the seventeenth century, settled in the mountains of Parga, south of Albania, where they formed an independent republic. They lived partly by rearing cattle and partly by plunder. Their chief village, Suli, was occupied by the Turks in 1822, and the Suliots then dispersed themselves throughout Greece.

Sulla (sul'a), LUCIUS CORNELIUS, a Roman dictator, was born in 738 B.C. He received a good education, but was notorious from his youth upwards for his excessive dissipation and debauchery. He served with distinction under Marius in the Jugurthine (107 B.C.) and Cimbrian (104-102) wars, and in 93 was chosen prætor. For his services in the Social war (90-88) he was appointed consul, (B.C. 88), and the province of Asia, with the conduct of the war against Mithridates, fell to his lot. Marius was also ambitious of this command, and resorted to acts of violence to carry his point, by which Sulla was compelled to escape from Rome. But Sulla reëntered the city at the head of his army, drove Marius to Africa, and then sailed for Greece at the beginning of 87 B.C. He expelled the armies of Mithridates from Europe (86), crossed into Asia (84), and was everywhere victorious, gaining plenty of wealth for himself and his soldiers, and forcing Mithridates to conclude a peace. Marius had died in 86 B.C., after proscribing Sulla and confiscating his property, but the party of Marius was still strong. Sulla now hastened to Italy, and landed at Brundusium with 40,000 men B.C. 83. He was joined by many of his friends who had been banished from Rome. He gained four battles over the Roman forces in person, and defeated a Samnite army under Telesinus. He entered the city victorious in 82, and immediately put to death between 6000 and 7000 prisoners of war in the circus. Rome and all the provinces of Italy were filled with the most revolting scenes of cruelty. After satisfying his vengeance by the murder or proscription of thousands he caused himself to be named dictator for an indefinite period (B.C. 81). He now ruled without restraint, repealed and made laws, abolished the tribuneship, and settled his veterans in various parts of Italy. In 79 B.C. he laid down his dictatorship,

and retiring to Puteoli, abandoned himself to all sorts of debauchery. He died in 78 B.C. See *Rome*.

Sullivan (sul'i-van), SIR ARTHUR SEYMOUR, born in London in 1842, son of a band-master. He became a choir-boy at the Chapel Royal, and in 1856 gained the Mendelssohn scholarship of the Royal Academy of Music, where he completed his musical education. In 1858 he went to Leipzig, and on his return in 1862 at once attracted attention by his music to Shakespeare's *Tempest*. He wrote oratorios (*Prodigal Son*, *Light of the World*), anthems, songs, etc.; but his most popular compositions were the burlesque operettas which he produced in conjunction with W. S. Gilbert. Among the most popular of these are *H.M.S. Pinafore* (1878), *Pirates of Penzance* (1880), *Patience* (1881), *Iolanthe* (1882), *Mikado* (1885), *The Yeomen of the Guard* (1888), and the *Gondoliers* (1889). In 1886 he set to music an arrangement of Longfellow's *Golden Legend*, which is one of his finest compositions. He was knighted in 1883, and died November 23, 1900.

Sullivan, JOHN LAWRENCE, famous American pugilist, born in Boston, Mass., in 1858. His greatest fight was in 1889, when he defeated Kilrain in a 75-round battle in Mississippi. He held the championship of the world for ten years, losing the title to Corbett in 1892 at New Orleans, being defeated in the 21st round. In later years he became a temperance lecturer. Died Feb. 2, 1918.

Sully (sul'i, Fr. sü-lē), MAXIMILIEN DE BÉTHUNE, DUC DE, Marshal of France and first minister of Henry IV, was born in 1560, and educated in the Protestant (Calvinistic) faith. He distinguished himself at the battle of Ivry in 1590, where he was severely wounded, and was afterwards of great assistance to the king in resisting the intrigues of the League. In 1597 he was appointed controller of finance, and by his excellent administration largely reduced taxation, and eventually paid off a state debt of 300,000,000 livres. He also received many other offices and dignities, and became adviser of the king in all his councils. His industry was unwearied, and he did all he could to encourage agriculture, which he regarded as the mainstay of the state. In 1606 the territory of Sully-sur-Loire was erected into a duchy in his favor. After the murder of Henry IV (1611) he retired from court and resigned most of his charges. He now occupied himself chiefly with agriculture, and rarely took part in political affairs. He was created a marshal by Richelieu in 1634 and died in 1641. His later years were employed in writing memoirs of his life and times. These are of much interest and importance.

Sulphates (sulf'atz), salts of sulphuric acid. Sulphuric acid is dibasic, forming two classes of sulphates, viz., *neutral sulphates*, in which the two hydrogen atoms of the acid are replaced by metal, and *acid sulphates*, in which one hydrogen atom only is so replaced. The general formula of the former class is M_2SO_4, and of the latter $MHSO^4$. (M represents a monovalent metal.) Of the sulphates, some are found native; some are very soluble, some sparingly soluble, and some insoluble. The most important sulphates are — sulphate of aluminum and potassium, or alum; sulphate of ammonium, employed for making carbonate of ammonia; sulphate of copper, or blue vitriol, much used as an escharotic in surgery, and also used in dyeing and for preparing certain green pigments; sulphate of iron, or green vitriol, used in making ink, and very extensively in dyeing and calico-printing; it is also much used in medicine; sulphate of calcium, or gypsum; sulphate of magnesium, or Epsom salts; sulphate of manganese, used in calico-printing; sulphate of mercury, used in the preparation of corrosive sublimate and of calomel; bisulphate of potash, much used as a flux in mineral analysis; sulphate of sodium, or Glauber's salts; sulphate of quinine, much used in medicine; sulphate of zinc, or white vitriol, used in surgery, also in the preparation of drying oils for varnishes, and in the reserve or resist pastes of the calico-printer. Many double sulphates are known.

Sulphides (sul'fīdz), binary compounds of sulphur with other elements.

Sulphites (sul-fītz), salts of sulphurous acid. The sulphites are recognized by giving off the suffocating smell of sulphurous acid when acted on by a stronger acid. A very close analogy exists between them and the carbonates. See *Sulphur*.

Sulphur (sul'fur), an elementary, non-metallic, combustible substance which has been known from the earliest ages; chemical symbol, S. It frequently occurs in a pure state in beds of gypsum or clay, but is generally associated with sulphate of strontium. It also occurs in chemical combination with oxygen and various metals, forming sulphates and sulphides. Formerly Sicily supplied the world with sulphur, but now

immense quantities are produced in the United States, notably in the mines of Calcasieu Parish, La., and those near Freeport, Texas. There are sulphur mines in Japan, New Zealand, Mexico, etc. It is also obtained by the roasting of iron pyrites; the condensed mass of sulphur thus obtained is broken into lumps and distilled. Native sulphur is usually separated from the earthy matter by a process of distillation, the sulphur vapors being liquefied by a condenser. The product obtained from native sulphur, or from iron pyrites, is afterwards refined by a further process of distillation. Pure sulphur is commonly met with in two forms, that of a compact, brittle solid, and a fine powder. It is nearly tasteless, of a greenish-yellow color, and when rubbed or melted emits a peculiar odor. Its atomic weight is 32, and its specific gravity 1.99. It is insoluble in water, and not very readily soluble in alcohol, but is taken up by spirits of turpentine, by many oils, and by carbon disulphide. It is a non-conductor of electricity. It is readily melted and volatilized. It fuses at 232° Fahr., and between 232° and 280° it possesses the greatest degree of fluidity, and, when cast into cylindrical molds, forms the common roll-sulphur of commerce. It possesses the peculiar property of solidifying at a higher degree, or when raised to 320°. From 480° to its boiling point (792°) it again becomes fluid, and at 792° it rises in vapor, which condenses in close vessels in the form of a fine yellow powder, called *flowers of sulphur*. Sulphur exists in two distinct crystalline forms, and also as an amorphous variety; these modifications are characterized by differences in specific gravity, in solubility in various liquids, and in many other points. Sulphur combines with oxygen, hydrogen, chlorine, etc., forming various important compounds; it also unites with the metals, forming sulphides. It is employed in the manufacture of gunpowder, matches, vulcanite, and sulphurous and sulphuric acids. It is also employed in medicine, and for various other purposes. *Sulphur chloride* (S_2Cl_2) is produced by passing chlorine gas into a retort containing melted sulphur. It is used for vulcanizing caoutchouc. Sulphur forms two combinations with oxygen, the *dioxide* (SO_2) and the *trioxide* (SO_3). The former is the sole product of the combustion of sulphur; it is a colorless gas, which may be liquefied and solidified by cold and pressure. This gas is used in the arts for bleaching silk, wool, straw, parchment, and generally such substances as are destroyed by the action of chlorine. Sulphur trioxide (SO_3) is a white crystalline solid, produced by the oxidation of the dioxide. *Sodium thiosulphate* ($Na_2S_2O_3$) is produced by boiling sulphur with soda lye, and passing sulphur dioxide into the solution until it is completely decolorized. It is largely used in the arts as an antichlor, and for fixing photographs. Carbon disulphide (CS_2) is a volatile liquid, with a poisonous vapor, produced by the action of sulphur upon carbon at high temperatures. It is used in chemical and dyestuffs industries; in the manufacture of nearly all explosives, paper and pulp, rubber goods, leather, matches, etc.

Sulphuretted Hydrogen (sul′fū-ret-ed· H_2S), a compound formed when hydrogen and sulphur come in contact in the nascent state. It is a transparent colorless gas, recognized by its peculiar fetid odor, resembling that of putrid eggs. It is very deleterious to animal life, and is often formed where animal matters or excrements putrefy. It is the active constituent of sulphurous mineral waters. It is also known by the name of *hydrosulphuric acid*, *sulphydric acid*, and *hydrothionic acid*. It is usually prepared by decomposing a metallic sulphide, especially sulphide of iron or of antimony, by means of hydrochloric or sulphuric acid. Sulphuretted hydrogen is of great use in the laboratory, in qualitative analysis, as by its means the metals can be divided into groups.

Sulphuric Acid (sul-fū′rik), or OIL OF VITRIOL, a most important acid discovered by Basil Valentine towards the close of the fifteenth century. It was formerly procured by the distillation of dried sulphate of iron, called *green vitriol*, whence the corrosive liquid which came over in the distillation, having an oily consistence, was called *oil of vitriol*. The principle upon which it is now manufactured was laid down by Roebuck in 1746, and consists in burning sulphur, or more frequently iron pyrites, in closed furnaces, and leading the fumes, mixed with oxides of nitrogen, into large leaden chambers, into which jets of steam are continuously sent. The oxides of nitrogen are produced by the action of sulphuric acid upon niter contained in pots, which are placed between the sulphur ovens and the chambers. The sulphur dioxide takes away part of the oxygen from the oxides of nitrogen, which are again oxidized by the air in the chambers. The sulphur trioxide produced unites with the steam to form sulphuric acid. The acid produced in the chamber is condensed in leaden vessels until it

reaches a certain gravity (about 1.72), when it is run into glass, or sometimes platinum vessels, where the condensation is continued until the specific gravity has increased to 1.84. The acid of gravity 1.72 constitutes the *brown* acid of commerce; it is largely used in the manufacture of superphosphate of lime and for other purposes. Pure sulphuric acid is a dense, oily, colorless fluid, exceedingly acid and corrosive, decomposing all animal and vegetable substances by the aid of heat. It unites with alkaline substances, and separates most of the other acids from their combinations with the alkalies. It has a very great affinity for water, and unites with it in every proportion, producing great heat; it attracts moisture strongly from the atmosphere, becoming rapidly weaker if exposed. The sulphuric acid of commerce is never pure, but it may be purified by distillation. With bases sulphuric acid forms salts called sulphates, some of which are neutral and others acid. (See *Sulphates.*) By concentrating sulphuric acid as far as is possible without decomposition, and cooling the liquid so obtained, crystals of the true acid, H_2SO_4, are formed. The ordinary acid is a hydrate of H_2SO_4 of varying composition. A very strong form of sulphuric acid, known as *Nordhausen acid*, is prepared by heating green vitriol in closed vessels; it is a solution of sulphur trioxide in sulphuric acid ($H_2SO_4SO_3$), or it may be regarded as *pyro-sulphuric acid.* It has a specific gravity varying from 1.86 to 1.92, and is chiefly used in the arts for dissolving indigo. Of all the acids the sulphuric is the most extensively used in the arts, and is in fact the primary agent for obtaining almost all the others by disengaging them from their saline combinations. Its uses to the scientific chemist are innumerable. In medicine it is used in a diluted state as a refrigerant.

Sulphuric Ether (ē'ther); ethylic, vinic, or ordinary ether $(C_2H_5)_2O$ is a colorless transparent liquid, of a pleasant smell and a pungent taste, extremely exhilarating, and producing a degree of intoxication when its vapor is inhaled by the nostrils. It is produced by distilling a mixture of equal weights of sulphuric acid and alcohol, and by various other means. Its specific gravity is 0.720. It is extremely volatile and highly inflammable; and its vapor, mixed with oxygen or atmospheric air, forms a very dangerous explosive mixture. It dissolves in 10 parts of water, and is miscible with alcohol and the fatty and volatile oils in all proportions. It is employed in medicine as a stimulant and antispasmodic. Ether, by its spontaneous evaporation, produces a great degree of cold, and is used in the form of spray in minor surgical operations for freezing the part, and thus rendering it insensible to pain. True sulphuric ether, known also as *sulphate of ethyl* $(C_2H_5)_2SO_4$, is an oily liquid of burning taste and ethereal odor, resembling that of peppermint. It is almost incapable of being distilled without decomposition, as at a temperature of about 280° it resolves itself into alcohol, sulphurous acid, and olefiant gas. See *Ethers.*

Sulphurous Acid. See *Sulphurous Oxide.*

Sulphurous Oxide (sul'fū-rus oks'-id), a gas formed by the combustion of sulphur in air or dry oxygen. It is transparent and colorless, of a disagreeable taste, a pungent and suffocating odor, is fatal to life, and very injurious to vegetation. At 45°, under the pressure of two atmospheres, it becomes liquid, and also at 0° under the pressure of one atmosphere. It extinguishes flame, but is not itself inflammable. It has considerable bleaching properties, so that the fumes of burning sulphur are often used to whiten straw, and silk and cotton goods. This gas is also called *sulphur dioxide;* when led into water it forms *sulphurous acid* (H_2SO_3). This acid readily takes up oxygen, passing into sulphuric acid; it is dibasic, forming salts called sulphites.

Sulphur Springs, county seat of Hopkins Co., Texas, 93 miles E. of Dallas. It has lignite mines, brick plant, oil mill, broom and mattress factories. Pop. 5558.

Sulpicians (sul-pīsh'yanz), a Roman Catholic congregation of missionary priests founded in 1642 at Paris by the Abbé Olier. They have a number of houses in Europe and America, and are chiefly engaged in training young men for the priesthood. They are called Sulpicians from the parish of St. Sulpice, where the congregation was first organized.

Sultan (sul'tan), in Arabic, signifies 'mighty one, lord.' It is the ordinary title of Mohammedan rulers. The ruler of Turkey assumes the title of *Sultan-es-selatin*, 'Sultan of sultans.' The title sultan is also applied to the sultan's daughters, and his mother, if living, is styled *Sultan Valide.*

Sultanpur (sul'tan-pör), a district of India, in Oudh; area, 1713 square miles. Chief river, the Gumti. Pop. 1,083,904.— The town **Sul-**

TANPUR, administrative headquarters of the district, has a pop. of 9550.

Sulu (sö-lö′), an archipelago forming the southernmost group of the Philippine Islands. It lies between Mindanao and Borneo and is surrounded by the Sulu and Celebes Seas. There are over 400 islands in the group, with an area of over 1500 sq. miles. The archipelago forms a long chain of islands divided into two large groups, the Jolo (Sulu) group and the Tawitawi group. The island of Jolo is the largest in the Sulu Archipelago, and has a series of mountains and hills of gentle slopes rising out of the sea, and undulating hills and valleys, cultivated or overgrown with cogon and other grasses. Bauno trees dot the landscape everywhere. Teak is a very important tree in the Jolo forests. The climate and soil are favorable to fruit culture. The best harbor in the island is Port Ulayan. Pearls, pearl shells, tortoise shell, fresh and dried fish, trepang, and shark fins constitute the marine products of Sulu. The archipelago has a population of 172,776, including 3721 Christians and 169,055 non-Christians.

Sumach (sū′mak; *Rhus*), a genus of shrubs of the nat. order Anacardiaceæ, with pinnate leaves and small flowers. They all have a lactescent acrid juice, and most of them possess valuable tanning properties. More than seventy species are known. *R. coriaria* is found in the countries about the Mediterranean. Its roots contain a brown, and its bark a yellow dye. The leaves and seeds are used in medicine as astringent and styptic, and the leaves are exported for use in tanning, dyeing and calico-printing. *R. typhīna* is an American species with hairy branches, hence its common name of stag's-horn sumach. It produces small red berries, and is cultivated in European gardens for ornament. *R. glabra*, another American species, is also grown for ornament, and its berries and branches are used for dyeing purposes. *R. venenāta*, commonly called dog-wood or poison sumach, is a shrub of the American swamps. It grows from 12 to 20 feet high, and produces greenish-white flowers. It is extremely poisonous, in some cases giving rise to inflammation of the skin followed by a pustular eruption. *R. radicans*, often called poison ivy, is a climbing variety. It affects certain individuals in the same manner as the poison sumach, but it is less virulent. The leaves of several of these species are now extensively collected in the United States for tanning or other purposes.

Sumatra (sö-mä′trà), a great island in the Indian Seas immediately under the equator, separated from the peninsula of Malacca by the Straits of Malacca and from Java by the Straits of Sunda. Greatest length, 1115 miles; greatest breadth, 275 miles; area, 161,612 square miles. Banca and other islands adjoin the coast. The west side of the island is mountainous, with peaks ranging in height from 2000 feet in the south to 5000 feet further north; and culminating in Indrapura, a volcano 12,400 feet high. The east side spreads out into interminable level plains. Copper, tin, and iron are found in abundance, and deposits of coal exist. The chief rivers are the Rokan, Musi, Jambi, and Indragiri, which all form extensive deltas at their mouths. Sumatra enjoys great equability of climate, but in many low-lying parts is unhealthy; rain falls almost incessantly in the south. Mangroves grow near the coast, and at higher elevations myrtles, palms, figs, and oaks of various species are met with. The camphor-tree prevails in the north, and among vegetable curiosities are the upas-tree and the gigantic Rafflesia. Pepper, rice, sugar, tobacco, indigo, cotton, coffee, are cultivated for export, and camphor, benzoin, catechu, gutta-percha and caoutchouc, teak, ebony, and sandal-wood are also exported. The fauna includes the elephant, the tapir, the two-horned rhinoceros, the tiger, the orang-outang and other apes, some species of deer and antelope, and numerous birds and reptiles. Of the domestic animals the chief is the pig, next to which rank the cow and the horse. The island is for the most part under the authority of the Dutch, and their possessions are divided into six governments. The most important native state is Acheen (which see), in the extreme north of the island. Sumatra has a very mixed population, consisting of Malays, Chinese, Arabs, and many native tribes. The Battas are a peculiar and interesting race, approaching the Caucasian type. Writing has been known among them from a very early period, and their ancient books are written in a brilliant ink on paper made of bark. The native tribes of Sumatra have no temples and no priests, but a form of Mohammedanism prevails among the Malays on the coast. The chief towns are Palembang, Padang, Bonkulin and Achin. Total pop. estimated at between 3,000,000 and 4,000,000. The Dutch acquired their territories in Sumatra in the sixteenth and seventeenth centuries. The British formed a settle-

nent at Bencoolen in 1685, and in 1811 seized the Dutch possessions on the island. These were restored in 1815, and by treaties in 1834 and 1871 the Dutch were allowed the right to enlarge their territories by treaty, or by conquest and annexation. The tidal wave accompanying the volcanic eruption of Krakatoa in 1883 caused great destruction on the south coast of Sumatra.

Sumba (söm'bå), same as *Sandalwood Island* (which see).

Sumbal (söm'bal), or SUMBUL, an Eastern name for the root of an umbelliferous plant, *Euryangium sumbul*. It contains a strongly odorous principle, like that of musk, and is regarded as an antispasmodic and stimulating tonic. Also an Eastern (Arabic) name of spikenard (which see).

Sumbul (*Euryangium sumbul*).

Sumbawa (söm'bä-wå), an island of the Indian Archipelago, lying south by west of Celebes, between Lombok and Flores, about 160 miles long from east to west, with a breadth varying from 13 to 31 miles. It is divided into several native states, governed by rajahs, all tributary to the Dutch. The soil is mostly volcanic, and very fertile, cotton, rice, tobacco, etc., being grown, besides the usual tropical fruits. Sumbawa is mountainous, and in the north is the volcano Temboro, 7600 feet high, of which an eruption in 1815 caused the loss of 12,000 lives. The inhabitants are of Malay race and Mohammedans. Pop. about 150,000.

Sumbul. See *Sumbal*.

Sumerians (sö-mer'yanz), a name equivalent to Accadians. See *Accadians* and *Assyria*.

Summary Proceeding, in law, said of a form of trial in which the ancient established course of legal proceedings is disregarded, especially in the matter of trial by jury. In no case can a party be tried summarily unless when such proceedings are authorized by legislative authority, as in a committal for contempt of court, the conviction of a person by justices of the peace, etc.

Summer (sum'er), the season of the year which in the northern hemisphere generally may be said to comprise the months of June, July and August. The astronomical summer lasts in the northern hemisphere from the June solstice to the September equinox, during which time the sun, being north of the equator, shines more directly upon this part of the earth, and rises much sooner and sets later, which renders this the hottest period of the year. The period of greatest heat generally takes place in August, since the influence of the sun's rays has then been felt for a long time on the earth, and the wind blowing from the north becomes milder owing to a moderation of the temperature in the polar circle caused by the thawing of the ice. In the southern hemisphere the summer lasts from the December solstice to the March equinox. See *Seasons*.

Summer-duck (*Aix Sponsa*), a species of duck, allied to the mandarin duck or Chinese teal (*Aix galericulata*), and distinguished as a genus by a short bill, with a large horny tip and straight edges, and by the hinder toe being unconnected to the other digits. These birds inhabit North America, and usually build their nests in the hollows and trunks of trees.

Summit, a residential city of Union Co., New Jersey, in the Orange Mountains, 12 miles w. of Newark. Has silk factory. Pop. 10,174.

Summit Hill, a borough of Carbon Co., Pennsylvania, 7 miles w. of Mauch Chunk, in a coal-mining region. Pop. 5499.

Summons (sum'unz), in law, a writ addressed to the defendant in a personal action admonishing him to appear in court. It must contain the names of all the defendants, the name and address of the person taking it out, and the date of issue; but it need not state the form or cause of action. A summons should be served on the defendant in person; but if reasonable efforts are made to do this, and the defendant is aware of its issue, the judge may authorize the plaintiff to proceed in the action without personal service. In the United States a summons is a writ commanding the sheriff, or other authorized officer, to notify a party to appear in court, to answer a complaint made against him, and in the same writ specify some day therein mentioned.

Sumner (sum'ner), CHARLES, jurist and statesman, was born at Boston, Massachusetts, January 6, 1811, and educated at Harvard University. In 1834 he was called to the bar, and shortly afterwards became reporter of the United States Circuit Court. In 1836 he published three volumes of Judge Story's decisions, subsequently known as *Sum-*

ner's Reports, and edited a periodical called the *American Jurist*. He visited Europe in 1837, and returned to Boston in 1840, where he resumed his legal practice. Between 1844 and 1846 he edited and published *Vesey's Reports*, in twenty volumes. In 1851 he was elected to the senate of the United States, and distinguished himself by his strong antipathy to slavery. In May, 1856, after delivering a speech vigorously attacking the slaveholders, he was violently assaulted by P. S. Brooks, a member representing a slaveholding State (South Carolina). His injuries compelled him to absent himself from public duties for nearly four years. He was a supporter of Lincoln and Hamlin, and in 1861 he became chairman of the senate committee on foreign relations. He was an enemy to the policy of President Johnson, and opposed the home and foreign policy of President Grant. After the latter's reelection in 1872 Sumner seldom appeared in debate. He died at Washington, March 11, 1874.

Sumner, EDWIN VOSE, soldier, born at Boston, Massachusetts, in 1797. He entered the army, served as captain on the western frontier for many years, and as major in the Mexican war, where he won distinction. He was governor of New Mexico 1851-53; as colonel escorted Abraham Lincoln from Springfield to Washington in 1861, and served as brigadier and major-general in the Civil war. He commanded a corps at Fair Oaks and Malvern Hill and one of the three divisions of the army at Fredericksburg. He was put in command of the Department of the Missouri in 1863, and died March 21 of that year.

Sumner, JOHN BIRD, Archbishop of Canterbury, son of a clergyman, was born at Kenilworth, Warwickshire, in 1780, and educated at Eton and Cambridge, where he took high honors. He entered the church, and became rector of Mapledurham. In 1820 he was made canon of Durham, in 1828 bishop of Chester, and in 1848 archbishop of Canterbury. He died in London in 1862.

Sumter (sum'ter), a city, county seat of Sumter Co., South Carolina, 44 miles E. by S. of Columbia, on several railroads. It has a large cotton trade, also cottonseed-oil mills, foundry and machine shops, and manufactures of wood, brick, building materials, etc. It was one of the pioneers in the commission form of government, adopted in 1912. Pop. (1920) 9508.

Sumter, FORT. See *Fort Sumter*.

Sumptuary Laws (sump'tū-a-ri), laws intended to repress extravagance, especially in eating and drinking, and in dress. They were common in ancient times, and also appear in the old statute books of most modern nations. They were more frequently enacted in ancient Rome than in Greece. After the Twelve Tables, the first Roman sumptuary law was the Lex Oppia (215 B.C.), directed exclusively against female extravagance in dress, jewelry, etc. The other Roman laws of this kind were nearly all designed to suppress extravagance in entertainments. The Lex Julia, the last sumptuary law, was passed in the reign of Augustus. Sumptuary laws were revived by Charlemagne, and in France various laws and decrees of a similar nature were passed down to the reign of Louis XV. In England these laws were passed from the reign of Edward III down to the time of the Reformation. Most of them were repealed by 1 James I chap. xxv, but they were not all expunged from the statute books till 1856. Sumptuary laws were also passed by the ancient Scottish legislature, but they were all repealed, evaded, or neglected. Such laws furnish modern historians with valuable evidences of the manners and customs of different nations in past ages. They are, however, altogether foreign to the spirit of modern legislation, and contrary to the most elementary principles of political economy and no such laws have been enacted in the United States.

Sumy. See *Soumy*.

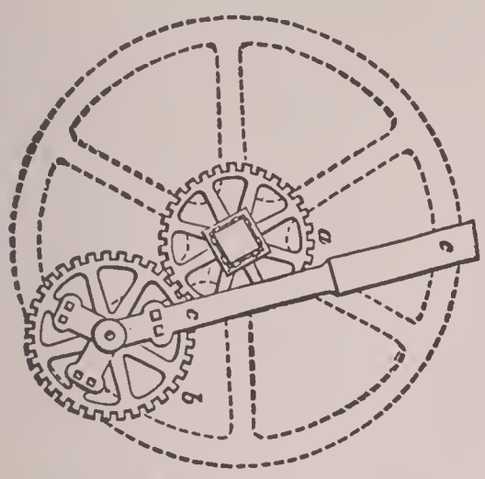
Sun, the central orb of the solar system, that around which revolve the earth and the other planets. The sun appears to be a perfect sphere, with a diameter of 866,900 miles; its mean density is about ¼, taking that of the earth as 1; its mean distance from the earth is taken as nearly 93,000,000 miles. It rotates on its own axis; this axis of rotation being inclined to the ecliptic at an angle of 82° 40′; and its rotation period is estimated at 25 days, 7 hours, 48 minutes. The mass of the sun is about 750 times that of all the other members of the solar system combined, and the center of gravity of the solar system lies somewhere in the sun, whatever may be the relative positions of the planets in their orbits. The dark spots on the sun discovered by Galileo have been shown to be hollows, and their depth has been estimated at from 3000 to 10,000 miles. The spots are very changeable in their

figure and dimensions, and vary in size from mere points to spaces of more than 50,000 miles in diameter. It is from observations of these spots that the sun's rotation on its axis has been calculated. The frequency of sun spots attains a maximum every ten and a half years, the number of spots falling off during the interval to a minimum, from which it recovers gradually to the next maximum. This periodicity has been thought to be intimately connected with the meteorological phenomena observed on the earth, especially with the rainfall. Spots are called *maculæ*, brighter portions of the sun are called *faculæ*, and the lesser markings are called *mottlings*. The sun is now generally believed to be of gaseous constitution, covered with a sort of luminous shell of cloud formed by the precipitation of the vapors which are cooled by external radiation. This dazzling shell is termed the *photosphere*. The spots are supposed to be cavities in this cloud-layer, caused by the unequal velocities of neighboring portions of the solar atmosphere. Zöllner, who considers the body of the sun to be liquid, sees in them slags or scoriæ floating on a molten surface, and surrounded by clouds. It is estimated that the sun's radiation would melt a shell of ice covering its own surface to a depth of between 39 and 40 feet in one minute, but the temperature of the surface has not yet been ascertained. It is probable, however, that the temperature and radiation have remained constant for a long period. The photosphere is overlaid by an atmosphere which appears by the evidence of the spectroscope to contain nearly all the materials which enter into the composition of the sun, since in the lines of the spectrum of sunlight is found proof of the existence in the solar atmosphere of the following substances: — Iron, titanium, calcium, manganese, nickel, cobalt, chromium, barium, sodium, magnesium, copper, hydrogen, zinc, sulphur, cerium, strontium, and potassium. In 1706 Captain Stannyan observed a blood-red streak just before the limb of the sun appeared after a total eclipse, and such appearances were subsequently observed, being first scientifically described in 1842 under the names of flames, protuberances, or prominences. In 1868 the spectroscope showed that these appearances were due to enormous masses of glowing hydrogen gas floating above the sun, similarly to clouds in our atmosphere. The region outside the photosphere in which these colored prominences are observed has been called the *chromosphere*, which has an average depth of from 2000 to 6000 miles. The incandescent hydrogen clouds stretch out beyond this to altitudes of 20,000 to 100,000 miles, and jets of chromospheric hydrogen have been observed to reach a height of 200,000 miles in twenty minutes, and disappear altogether within half an hour. Outside the chromosphere, extending very far out from the sun, is the *corona*, an aurora of light observed during total eclipses, and which is now the chief object to be observed by eclipse expeditions. This phenomena has been shown to be connected with the existence of what is called the 'coronal atmosphere,' but the nature of this atmosphere is as yet undetermined. The amount of light sent forth by the sun is not exactly measureable, but the amount of heat has been pretty accurately computed, and it is equivalent in mechanical effect to the action of 7000 horse-power on every square foot of the solar surface, or to the combustion on every square foot of upwards of 13½ cwts. of coal per hour. Of this heat only a minute fraction is received by the earth and the other planets, the remainder radiating out into interstellar space.

Sun, Worship of the. Sun worship probably prevailed in the earliest times among all nations, and the chief deities of the polytheisms of ancient India, Egypt, Greece, Rome, Germany (Indra, Amoun Ra, Zeus, Jupiter, Odin, etc.), are, according to a popular theory, all identified as sun gods. But by some people the sun itself was worshiped as a physical object associated with fire, as among the followers of Zoroaster, the ancient Celts, etc. Many of the American Indians worshiped the sun, including those of the southern United States, Mexico and Peru, the latter of which had the most developed system.

Sun and Planet Wheels, an ingenious contrivance adopted by Watt in the early history of the steam engine, for converting the reciprocating motion of the beam into a rotary motion. In the annexed figure the sun wheel *a*, is a toothed wheel fixed fast to the axis of the fly-wheel, and the planet wheel *b* is a similar wheel bolted to the lower end of the connecting-rod *c*; it is retained in its orbit by a link at the back of both wheels. By the reciprocating motion of the connecting-rod the wheel *b* is compelled to circulate round the wheel *a*, and in so doing carries the latter along with it, communicat-

ing to the fly-wheel a velocity double its own.



Sun and Planet Wheels.

Sun-bear, a bear of the genus *Helarctos;* the Malay bear, *H. malayanus,* called by the natives bruaug, is a small animal with a slender form. It has a close black coat and a white mark on the throat. See *Bear.*

Sun-bird, the name given to a family (*Nectariniidæ*) of tenuirostral insessorial birds, which are confined to the tropical regions of Africa and Asia, and in brilliant plumage and habits resemble the humming-birds. They live on insects and the juices of flowers; their nature is lively. They build in trees; some species make dome-like nests, which they suspend at the extremities of twigs or branches.

Sunbury (sun'bu r-i), a borough, county seat of Northumberland Co., Pennsylvania, on the Susquehanna and on the Pennsylvania and the Philadelphia & Reading railroads. It is an important shipping point for coal and lumber, and has extensive railroad shops, silk mills and converting works, casket factories, large flouring mill, etc. Pop. (1910) 13,770; (1920) 15,721.

Sunda (sun'dȧ), Strait of, between the islands of Sumatra and Java, connecting the China Sea and the Indian Ocean; 15 miles wide.

Sunda Islands, a group of islands in the Indian Archipelago; composed of the Great Sunda Islands, namely, Sumatra, Borneo, Celebes, Java, Madura, Banca, and Billiton; and of the Lesser Sunda Islands, namely, Bali, Lombok, Sumbawa, Flores, Sandalwood Island or Sumba, Ombai, the Timor group, etc.

Sun Dance, a dance in the form of a religious ceremony, practiced by some of the North American Indian tribes. Among the Sioux and Blackfoots, it was a striking performance, often marked by wild and dramatic incidents. It still survives among the Dakota, Assiniboine, Ponca, Cheyenne, Arapaho, Crow, the Plains, Cree and Sarcee. It is usually held about the beginning of July and lasts from five to fourteen days.

Sunday, lit. 'the day of the sun,' the first day of the week, called by Christians the Sabbath (q. v.), or Lord's Day.

Sunday, William Ashley ('Billy'), an American evangelist, born at Ames, Iowa, November 19, 1862; was educated at the high school at Nevada, Iowa; later studied at Northwestern University, and in 1912 received an honorary degree (D.D.) from the Pennsylvania College for Women. He was a professional base-ball player, 1883–90, on the Chicago, Pittsburgh and Philadelphia teams of the National League; was assistant secretary of the Y. M. C. A., Chicago, 1891–95; and has been an evangelist since 1896. In 1903 he was ordained to the Presbyterian ministry by the Chicago presbytery.

Sunday-schools, schools held on Sunday for the purpose of imparting religious instruction to the young by means of reading and repetition in the Bible, catechism, hymns, etc. In 1527 Martin Luther established several Sunday-schools in Germany for the instruction of children and youths in reading the Holy Scriptures, and in the latter half of the same century Cardinal Borromeo organized similar schools throughout Milan. Robert Raikes, an editor of Gloucester, England, who started a Sunday-school in that town in 1781, is frequently credited with the institution of the modern Sunday-school. But there seems little warrant for this, not even in Britain, since John Knox had organized such a school in Scotland as early as 1560, while in America such schools had been established a century before the Raikes school. Among the earliest in the colonies were those of Roxbury, Mass., in 1674; Norwich, Conn., in 1676, and Newtown, Long Island, in 1683. The earliest record, made at the Pilgrim Church, Plymouth, Mass., in 1680, is to the effect that "The Deacons be requested to assist the minister in teaching the children during intermission on Sabbath." A school was established in Ephrata, Pa., in 1740, and one in Hanover Co., Va., in 1786. In Philadelphia a First-day or Sunday-school Society was organized in 1791 to give religious instruction to poor children. In New York and Boston the movement gained great strength early in the 19th century. Now the work is thoroughly organized and its excellent results are apparent in all portions of the land. In

1873 a plan for uniform Bible lessons was formally adopted in this country and accepted by England and Canada. It was in this way that the International Sunday-school Lessons had their origin. The number of Sunday-schools in the United States reported to the International Sunday-school Convention, 1914, was 175,685; teachers and officers, 1,690,739; scholars, 16,750,297. The total number in the world reported at the Zürich convention of 1913 was, schools 297,866; teachers, 2,624,896, and scholars 26,076,593.

Sunderbunds (sön'dur-bunz), or SUNDARBANS, a vast tract of forest and swamp forming the southernmost portion of the Gangetic Delta, at the head of the Bay of Bengal; estimated area, 6526 square miles. The country is one vast alluvial plain, where the continual process of landmaking has not yet ceased. It abounds in morasses and swamps, and is mainly an impenetrable jungle infested by tigers and other wild animals. It has never been surveyed and no census has been taken of the territory. The tract gets its name from the sundri (*Heritiera littoralis*), a timber tree which is very abundant.

Sunderland (sun-dur-land), a seaport of England, at the mouth of the Wear, county of Durham, 13 miles N. E. of Durham, and 12 miles S. E. of Newcastle. It has parks, a museum, a free library, a school of art, etc. The principal buildings include St. Peter's, an ancient parish church on the site of the monastery in which the Venerable Bede was educated, many other churches and chapels, theaters, etc. The river is crossed by a castiron bridge, built in 1796, and since reconstructed and strengthened. The harbor with its docks covers 150 acres, and its entrance is formed by two stone piers. The staple trade interests of the place are shipping, the coal trade, and shipbuilding, and there are also large factories for the making of marine engines, iron work, bottles, glass, earthenware, rope, etc. Coal is the chief export; the imports are chiefly timber and grain, with various raw materials and provisions. Pop. 151,162.

Sun-dew (*Drosĕra;* nat. order *Droseraceæ*), plants growing in bogs and marshes, having leaves clothed with reddish hairs bearing glands which exude drops of clear glutinous fluid, glittering like dew-drops, whence the name. A characteristic of these plants is their habit of capturing insects by their viscid secretion. When the insect alights on the disk or even slightly touches one or two of the exterior tentacles, it is at once entangled by the viscid secretion. The tentacles to which it is adhering begin to bend and pass on their prey to the tentacles next succeeding them inwards and the insect is thus carried by a curious rolling movement to the center of the leaf. On all sides the tentacles become inflected in a like manner, and the blade of the leaf almost closes up, while the insect is drowned in the increased secretion which its presence has stimulated. After the absorption of the digestive matter, which consumes a varying period, the tentacles unbend and the leaf resumes its normal appearance. The digestive tract has also been traced in the Venus fly-trap (*Dionæa*), the butterwort (*Pinguicula*), the pitcher-plant (*Nepenthes*), etc.

Sun-dial. See *Dial.*

Sundsvall (söns'val), a seaport of Sweden, on the Gulf of Bothnia, near the mouth of the Indals, with important exports of timber and iron. Pop. (1911) 16,855.

Sun-fish (*Orthagoriscus*), a name given to a number of fishes, but properly applied to a marine form, *Orthagoriscus*, order *Plectognathi.* Two species are classified, the rough or short sun-fish (*O. mola*), of which one of the largest specimens preserved is 7 ft. 6 in. long; and the rarer smooth or oblong sunfish (*O. truncatus*), which seldom exceeds 2 ft. in length. The name also has been applied to the basking-shark. In the United States the name is given to a group of brilliantly marked fresh-water fishes belonging to the family *Centrarchidæ.* The species are quite numerous. They are very bold, and take the hook with avidity. The name is variously regarded as derived from the form of the fish and from its habit of floating at the surface, as if to enjoy the sun.

Sun-flower (*Helianthus*), nat. order *Compositæ*, a genus of plants, so called from the ideal resemblance of the yellow flowers to the sun with its golden rays. The root is mostly perennial; the stem herbaceous, upright, and often tall; the leaves opposite or alternate, undivided, often rigid and scabrous; the flowers large and terminal, usually disposed in a corymb. The species are numerous, and mostly inhabit North America. The gigantic sunflower (*H. annuus*), common in gardens, is a native of Peru. The stem is from 6 to 15 feet in height; the flowers, sometimes 1 foot in diameter, are usually turned towards the south. The seeds form an excellent nourishment for poultry and for cage birds; and an edible oil has also been expressed from them. For the *Helianthus tuber-*

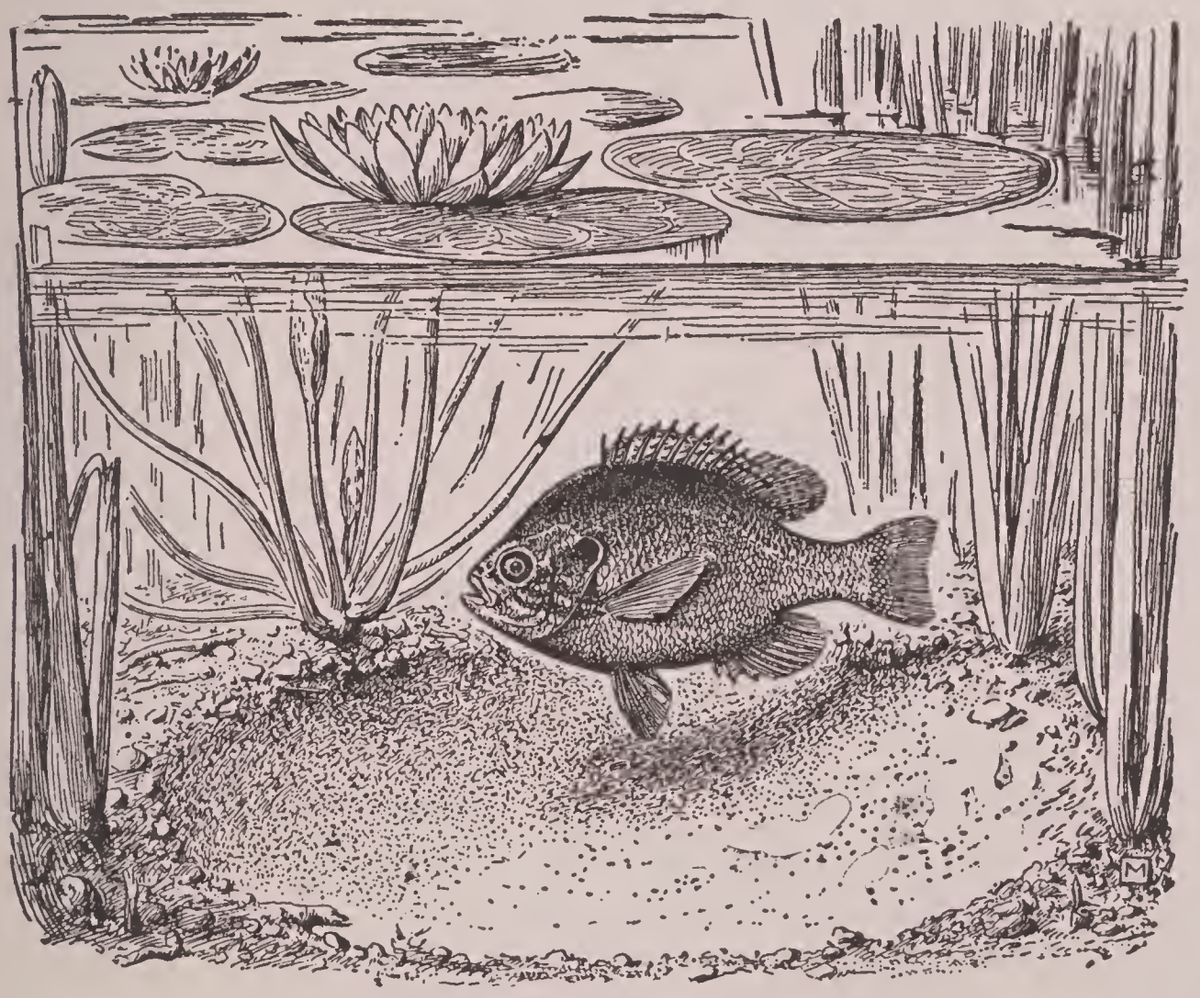
osus, or Jerusalem artichoke, see *Artichoke.*

Sunn, SUNN-HEMP, a material similar to hemp, imported from the East Indies, and extensively used in the manufacture of cordage, canvas, etc. It is obtained from the stem of the *Crotalaria juncea*, a shrubby leguminous plant 8 to 12 feet high. It is called also *Bombay Hemp, Madras Hemp.*

Sunnites (sun'īts), the so-called orthodox Mohammedans, in contradistinction to the Shiites or heterodox Mohammedans. They form by far the larger of the two divisions, embracing the Mohammedan inhabitants of Egypt and the rest of Africa, Syria, Turkey in Europe and Asia, Arabia, etc. They chiefly differ from the Shiites in receiving the Sunna (a collection of traditions relating to Mohammedanism) as of equal importance with the Koran, while the Shiites reject it absolutely.

Sun-stroke, any sudden and severe injury to the health resulting from the exposure of the head to a hot sun. The most usual symptoms of sun-stroke are the following: —Pains in the head, accompanied by fever; lethargy, or suffering which prevents sleep; congestion of the brain or other nerve-centers, or an inflammation of the brain sometimes ensues, and often terminates fatally. Sometimes the effects of the stroke can be discerned only in impaired bodily health or mental vigor dating from some occasion on which the patient was exposed to a violent sun.

Sun Yat Sen, Chinese reformer, to whose effort the overthrow of the Manchu dynasty in 1911 was largely due. He was born in 1862, studied medicine, and became a prominent advocate of western ideas. He formed the 'Young China party' and organized a peaceful revolution. See *China.* Elected provisional president of the Chinese republic, he resigned in favor of Yuan Shi-kai.



Sunfish on Nest.

Supercargo (sū-per-kar'gō), a person charged with the accounts and disposal of the cargo and with other commercial affairs in the merchant ship in which he sails as agent for the owner of the cargo.

Supererogation (sū-per-er-u-gā'-shun), WORKS OF, in the Roman Catholic Church, the name for a class of good works which are considered to be not absolutely required of each individual as conditions to salvation. Such good deeds, it is believed, God may accept in atonement for the defective service of another.

Superfœtation (sū-per-fē-tā'shun), a second conception after a prior one, and before the birth of the first child, by which two fœtuses are growing at once in the same womb. Several certified cases have occurred in which women have given birth to two children, the second child being born at periods varying from 90 to 140 days later than the first. These certainly appear to be cases of superfœtation. The possibility of superfœtation in the human female has been vigorously opposed by some eminent physicians, and as vigorously defended by others. Some believe that up to the third month of gestation a second conception may follow the first, and that this will satisfactorily account for all the cases of superfœtation on record. It has also been argued that the human uterus may be *double* in some cases, and that in each of its cavities a fœtus may be contained.

Superior (sū-pē'ri-ur), a city and port of entry, capital of Douglas Co., Wisconsin, situated at the head of Lake Superior, and separated by St. Louis Bay from Duluth, Minnesota. It has some notable public buildings, a state normal school and St. Mary's Hospital, and is an important shipping point for iron products, grain, flour, lard, cement and lumber. There are extensive docks and elevators, one with a capacity of 10,000,000 bushels. Its manufactures include large lumber mills, ship yards, iron works, etc. Pop. (1910) 40,384; (1920) 39,624.

Superior, LAKE, the largest expanse of fresh water in the world, and the most westerly and most elevated of the North American chain of lakes. It washes the shores of the State of Minnesota on the west, those of Wisconsin and the northern peninsula of Michigan on the south, and those of Canada in other directions. Its greatest length is 420 miles, greatest breadth 160 miles; circuit about 1750 miles; area about 32,000 square miles (or the same as that of Ireland). It is 630 feet above sea-level, and varies in depth from 80 to 200 fathoms. In shape it forms an irregular crescent, dotted with numerous islands towards its northern and southern sides. The northern shore consists of cliffs varying in height from 300 to 1500 feet, but the southern shore is low and sandy, although occasionally interrupted by cliffs, among which are the fantastic Pictured Rocks, 300 feet high, one of the greatest natural curiosities of the United States. The waters of the lake are remarkable for their transparency, and are well stocked with fish, principally trout, white-fish, and sturgeon. The lake receives more than 200 streams, and about thirty are of considerable size. The outlet is at the southeast by St. Mary's River (which see). Fish, iron, and copper are the chief exports, the latter existing in valuable veins on both the shores and islands of the lake, and the iron in vast quantities in the Minnesota and Wisconsin border lands.

Superior Planets. See *Planets.*

Supernaturalism (sū-per-nat'ū-ral-izm), a term used chiefly in theology, in contradistinction to *rationalism.* In its widest extent supernaturalism is the doctrine that religion and the knowledge of God require a revelation from God. It considers the Christian religion an extraordinary phenomenon, out of the circle of natural events, and as communicating truths above the comprehension of human reason. Rationalism maintains that the Christian religion must be judged of, like other phenomena, by the only means which we have to judge with, namely reason. See *Rationalism.*

Supple-jack (sup'l), a popular name given to various strong twining and climbing shrubs. The supple-jack imported into Europe for walking sticks is the barked branches of one or more West Indian species of *Paullinia*, nat. order Sapindaceæ. The name is also given to a rhamnaceous twiner (*Berchemia volubilis*), found in the southern United States.

Supporters, in heraldry. See *Heraldry.*

Suppuration. See *Inflammation.*

Supralapsarians (sū-pra-lap-sā'ri-anz), in theology, those who maintain that God, antecedent to the fall of man, decreed the apostasy and all its consequences, determining to save some and condemn others, and that in all He does He considers His own glory only; opposed to *Sublapsarians* (which see).

Supra-renal Capsules (sū-pra-re'nal) two small yellowish glandular bodies

WILLIAM HOWARD TAFT, CHIEF JUSTICE, AND HIS ASSOCIATES

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In June, 1921, President Harding nominated former President Taft to succeed the late Edward D. White as Chief Justice of the United States Supreme Court. The group shows: (Seated, left to right) Justice Day, Justice McKenna, Chief Justice Taft, Justice Holmes, Justice Van Devanter. (Standing) Justice Brandeis, Justice Pitney, Justice McReynolds, Justice Clarke.

which exist, one at the front portion of the upper end of each kidney. (See *Kidney.*) They have no excretory duct, and are connected with the kidneys by areolar tissue only. They consist of an outer or *cortical*, and an inner or *medullary* portion, the former being of a deep yellowish color, and the latter of a dark brown or black hue, and of a soft and pulpy formation. The capsules are furnished with numerous nerves, and derive their blood from the *aortic*, *renal* and *phrenic* arteries, returning it by the *supra-renal* vein. They are present in all mammals. Their exact functions are as yet uncertain. In the embryo they are larger than the kidneys themselves, but afterwards greatly diminish, and in the adult possess only about $\frac{1}{28}$ of their original bulk. See *Addison's Disease.*

Supremacy (sū-prem'a-si), Royal, as a term in English law, is practically restricted to denote the authority of the crown in matters ecclesiastical. After the abolition of the papal supremacy at the English Reformation, the royal supremacy was affirmed by various acts under Henry VIII and Elizabeth, all enforcing an *oath of supremacy.* The oath was taken by holders of public offices along with the oath of allegiance, and afterwards with that of abjurgation, until the three were consolidated in one in the reign of Victoria. The new oath of allegiance which is imposed upon members of parliament does not in express terms affirm the royal supremacy in ecclesiastical matters.

Supreme Court, a court provided for in the Constitution of the United States and created in 1789, its purpose being to deal with controversies to which the United States is a party; to controversies between two or more States; between a State and citizens of another State; between citizens of different States; all cases in law and equity arising under the constitution; all cases affecting ambassadors, other public ministers or consuls; all cases of admiralty and maritime jurisdiction. In the exercise of these functions the question of the constitutionality of a law passed by Congress or State legislatures often arises, and any law pronounced unconstitutional, or out of agreement with the requirements of the constitution, by a majority of the Supreme Court judges becomes null and void. This court, as now constituted, consists of nine justices (including the chief-justice), appointed by the President and senate. The salary of the chief-justice is $15,000; of the associate justices, $14,500. Similar courts have been instituted in the several states, as courts of final appeal in questions of law affecting the citizens of a state. In 1875 a Supreme Court of Judicature was formed in England, consisting of a *High Court of Justice* and a *Court of Appeal*, the latter being the final court of appeal in the kingdom. No appeal can be taken from a decision of the High Court in criminal matters, except for error of law apparent on the record passed regarding which no question has been reserved.

Surabaya. See *Sourabaya.*

Suradanni (sö-ra-dan'i), a valuable kind of wood growing in Demerara.

Surajah Dowlah (sö-rä'ja dou'la; *Siráj-ud-Daulah*), the last independent nawaub of Bengal, under whom was perpetrated the massacre of the Black Hole (which see). He succeeded his grandfather, Ali Verdy Khan, in 1756, and within two months of his accession found a pretext for marching on Calcutta. On the arrival of Clive and Admiral Watson he retreated to Moorshedabad, but was routed at the battle of Plassey (June 23, 1757). He then fled up the Ganges, but was betrayed by a *fakir*, and was put to death by order of the son of Meer Jaffier, the new nawaub. Surajah Dowlah's reign lasted fifteen months, his age at the time of his death being barely twenty.

Surakarta. See *Sourakarta.*

Surat (sö-rät'), a town of India, Bombay Presidency, capital of a district of same name, on the left bank of the Tapti, about 20 miles above its mouth in the Gulf of Cambay. The town possesses few attractions, and consists of narrow winding streets lined with lofty houses. It contains several public buildings, including two hospitals, and an old castle or fortress now containing public offices. The organization of trade guilds is here highly developed. The chief exports are agricultural produce and cotton; but the trade and importance of the town are insignificant compared with former times, Surat in the eighteenth century being perhaps the foremost city in India. Pop. 119,306.

Surd. See *Irrational Quantities.*

Surety. See *Guarantee.*

Surf-bird, a plover-like bird (*Aphriza virgata*) found on the Pacific coasts of North and South America. It is akin to sandpipers and turnstones, and is sometimes called Boreal Sandpiper.

Surf-duck, or SURF-SCOTER, a species of duck (*Oidemia perspicillata*), about the size of a mallard, frequenting the coasts of Labrador, Hudson Bay, and other parts of North America. See also *Scoter*.

Surface-tension, that property in liquids by which a liquid surface acts as if it were a stretched elastic membrane. This idea was first developed in 1751, and in 1805 was applied by Young to explain capillarity and other phenomena. It was developed in its complete mathematical forms by Laplace and Gauss. It is the cohesive power which keeps soap-bubbles intact until very thin. Much attention has been given to the subject in recent years, including the phenomenon shown in the rippling of liquid surfaces.

Surgeon-fish. See *Sea-surgeon*.

Surgery (sur'jėr-i), the operative branch of medicine or that part of the medical art which is concerned with the removal of injured parts or organs, or with the healing of lesions by means of operations on the parts affected, either by the hand or with instruments. Surgery early became separated, for practical ends, from medicine, and by a natural expansion came to embrace two parts, the science pertaining to surgical operations, and the art required for conducting them. From this arose a mischievous distinction between medical and surgical cases. We have thus surgical and medical anatomy, surgical and medical pathology, and surgical and medical clinics. But the progress of science has both extended the domain of surgery, and made the relation between it and medicine more intimate. The origin of surgery may almost be held to be coeval with the human race. Herodotus says that the medical art in Egypt was divided into numerous branches representing each member of the body. The Greeks made considerable progress in surgery, and the Hippocratic collection contains six surgical treatises in which important operations are described as conducted in a mode little behind the modern practice. Medicine was first cultivated at Rome by Greek slaves. It afterwards became a special science, and among its professors who advanced the art of surgery were Archagathus (200 B.C.), surnamed the executioner, from his frequent use of the knife; Asclepiades, to whom is attributed the origin of laryngotomy; and Themison, the first to use leeches. A greater name than these is that of Celsus, called the Latin Hippocrates, who flourished about the beginning of the Christian era. He mentions autoplastic operations, lithotomy, the use of ligatures, the treatment of hernias, and a method of amputation. Galen, who died 200 A. D., did much for medicine but little for surgery. Paul of Ægina, a practitioner of the seventh century, may be looked upon as the last representative of the Græco-Roman school. The Arabs were initiated into medicine and surgery by the translation of the works of the Greeks. Among the Asiatic Arabs the only devoted student of surgery who has left any record of his art is Abulcasis, who flourished at the beginning of the twelfth century.

On the decline of the Roman Empire, the medical art in Europe fell entirely into the hands of the monks and when, in 1163, the Council of Tours prohibited the clergy from performing any operation, surgery became incorporated with the trade of barber, and was reduced to the simplest operations, chiefly that of letting blood. The earliest revival of science arose from the contact of Europeans with the Eastern nations, particularly the Arabs, and before the close of the eleventh century Salerno, in Italy, acquired celebrity for a school of medicine in which all the teachers were laymen. This school acquired the right to confer the degrees of master and doctor. Among surgeons of reputation of the Salernian school, may be mentioned Roger of Parma, and his disciple Roland, who made great use of cataplasms and other emollients. Guy de Chauliac, the first great surgeon of France, belongs to the latter half of the fourteenth century. Berengario de Carpi held a chair at Bologna from 1502 to 1507. He boasted of having dissected more than 100 dead bodies, and made important discoveries. Vesalius, a Belgian physician, born 1514; died 1564, is regarded as the father of modern anatomy. He prepared the way for Ambrose Paré, who did for surgery what Vesalius had done for anatomy. Paré was surgeon in ordinary to Henry II, Charles IX, and Henry III. His works were translated into English, and include a general treatise on surgery, and a special treatise on wounds. Among the great surgeons of the sixteenth century were Paracelsus, who advocated a thorough reform in surgery;

Guillemeau, whose special study was ophthalmia; Pineau, a skilful surgeon and lithotomist; Jacques Démarque, one of the first authors who wrote on bandages; and Fabricius of Hilden in Germany, the author of a complete course of clinical surgery, and the inventor of surgical instruments for the extraction of foreign bodies from the ear, urethra, etc., which are still in use. In England, Harvey, the discoverer of the circulation of the blood, lectured on surgery; but a genuine school of surgery was first founded by Richard Wiseman, who has been called the Paré of England. His works were published in two vols. in 1676. In England the Company of Barber Surgeons, incorporated by Edward IV in 1461, gave place in 1745 to a separate corporation (now the Royal College of Surgeons). In 1731 the Royal Academy of Surgery was founded in Paris, and soon produced a school of surgeons so eminent as to take the lead of their profession in Europe. Among the eminent French physicians of the present period we may mention J. L. Petit, Mareschal, Quesney, Morand, and Louis. In the English school we have Cowper, Cheselden, Percival Pott, and John and William Hunter. Preëminent among these are Pott and John Hunter, the latter being the most eminent surgeon and physiologist of his day. The rapid advance of scientific knowledge in the nineteenth century was not without its influence on the art of surgery. This century will ever be conspicuous in the annals of surgery as that in which the inestimable boon of anæsthetics was conferred upon mankind, by which not only was pain in surgery abolished, but the extent of its operative department was immensely enlarged. Of no less importance has been the discovery of the relation of micro-organisms to putrefaction and to infectious diseases, and the consequent introduction of the antiseptic method of treating wounds. A scarcely less noticeable feature of this epoch has been the application of the rules of hygiene to the construction and management of hospitals, by which the general health of the patients has been much benefited, and the mortality reduced. The operative skill of the surgeons has kept pace with the increased precision in physiological knowledge, and surgical operations are now performed on many parts of the body which not long ago would have been deemed certain death to the patient. Diseased conditions in the cranium, the thoracic cavity, the abdomen, the joints, are all successfully treated. Cancerous affections are boldly treated by excision, while diseases of the uterus are now treated with a boldness and success which a few years ago seemed impossible. Among the eminent surgeons of the nineteenth century we may mention Astley Cooper, Abernethy, Brodie, Simpson, Lister in England; Dupuytren, Dubois, Bichat, in France; Gräfe, Langenbeck, in Germany; Physick, Mott, Gross, Sims, Pancoast, Mitchell, Barton, Agnew, Bigelow, Hodge, in the United States.

Since the introduction of anæsthesia and the enunciation of antiseptic doctrines, further progress has been mainly in elaboration and practical application of the principles involved. New anæsthetics have been introduced, many of which have for special operations advantages over chloroform. Of greater importance still is asepsis, the corollary of Lister's proposition; and surgeons now, if possible, seek exclusion rather than destruction of organisms. In many situations, however, aseptic surgery is an impossibility. The chief developments of the twentieth century so far have been the discoveries of Alexis Carrel in the field of *Vascular Surgery* (which see) and the work of George W. Crile in the prevention of *Surgical Shock* (which see).

The United States has played a leading part in the development of modern surgery. They created the art of orthopædic surgery—surgery to correct deformities—and are the most distinguished practitioners of the art. An Americanized Frenchman, Dr. Alexis Carrel, has opened the way to a revolutionary advance in medicine through the surgical treatment of diseases and worn-out tissue. See *Carrel.*

But, great as is the work that America has done in modern surgery, it is only a conspicuous part of an amazing whole. Here are some of the items: A finger that has been completely severed from the hand can be restored so that the full use of it is recovered; tissues that under old methods would be dead and useless can be revived by the application of intense heat; a wound of the heart can be sewed up as simpler wounds are sewed; a blood clot in the great artery of the lung can be removed; the bronchial tubes can be electrically lighted and cleared of dangerous obstructions; the brain can be freely treated by surgical means; and joints and even vital organs may be transplanted from one body to another and continue to perform their normal functions.

Surgical treatment may be necessary for (1) congenital defects, such as hare lip or club foot; (2) acquired defects, such as broken limbs or lacerated tissues; (3) the removal of foreign substances,

such as bullets or calculi, from within the body; (4) the removal of diseased or injured structures, which may constitute a danger or cause discomfort to the patient, such as gangrenous tissues, malignant tumors, necrosed bones, or carious teeth; (5) the relief of conditions which threaten a patient with inevitable death, such as arterial hemorrhage, laryngeal, intestinal, or urethral obstruction, strangulated hernia, or the pressure of intrathoracic effusions; (6) the substitution of new for lost tissues, as in skin-grafting, or in the injection of paraffin in place of lost or depressed nasal bones. Thus many surgical operations do not involve the use of the knife. A surgeon's primary aim is to heal, not to wound.

Military Surgery is a specialized surgery, or rather, it is Surgery under special conditions. War makes rapid changes in the conditions which surround an army surgeon: general accommodations, climate, food, supplies, assistance, the number of patients to be attended to—these and many other factors may make the problems which confront the military surgeon both serious and perplexing. War surgery implies a knowledge of general surgery, and each of these learns from the other. Just what advances in surgery are due to the late Great war can not yet be determined; but among them may be mentioned the Carrel-Dakin method of treating wounds. Dakin's solution consists of a solution of sodium hypochlorite which is free from caustic alkali; when properly made it is germicidal, but non-irritant and non-toxic; it destroys dead tissue, but does not dissolve blood-clot. The solution must be accurately prepared, and must be brought into contact with every part of the wound. Among the conditions which were met for the first time are shell-shock, trench-foot, poison-gases, and burns by liquid fire.

Surgical Shock. In the prevention of surgical shock due to fear and to exhaustion from the wounding of tissue, Dr. George W. Crile, of Cleveland, Ohio, made a notable advance by using three or four different drugs. Morphine is first administered to produce a negative state of mind, so that the patient has no initial fear when the anæsthetist approaches with the inhalation apparatus. Nitrous oxide is used in preference to ether, Dr. Crile reasoning that the nerves are just as active under ether as they are under normal conditions. A local anæsthetic, however, produces insensibility to pain in the region affected, not by making the patient unconscious—under an application of cocaine he is completely awake—but because it interrupts the flow of sensation from the seat of operation. Under these conditions the tissues cannot telegraph to the brain for aid, and the patient suffers no pain, not even unconscious pain. The operation proceeds for any length of time and is usually successful. In short, Dr. Crile's experiments seem to have ushered in a new era of surgery—the era of the 'shockless operation.' At the Lakeside Hospital in Cleveland Dr. Crile has performed thousands of operations, with a death rate in the last 1000 cases of less than 1 per cent.

Suricate (sö'ri-kāt; *Suricata tetradactyla*), an animal of the Cape Colony allied to the ichneumon, sometimes domesticated as being an exterminator of rats, mice, and other vermin.

Surinam (sö'ri-näm). See *Guiana, Dutch.*

Surinam Bark, the bark of *Andira inermis.* See *Andira.*

Su'rinam Toad. See *Pipa.*

Surmullet (sur'mul-et), a name of fishes forming the family Mullidæ, allied to the perches, and often called red mullets. They have two dorsal fins with a wide interval between them, the first being spinous, and two long barbels hanging from the lower jaw. The common red mullet (*Mullus barbātus*) of the Mediterranean is about 12 inches long, esteemed very delicious food, and was much prized by the Romans.

Surnames. See *Names, Personal.*

Surplice (sur'plis), a white garment worn by priests, deacons, and choristers in the Church of England and the Roman Catholic Church over their other dress during the performance of religious services. It is a loose, flowing vestment of linen, having sleeves broad and full, and differs from the *alb* only in being fuller and having no girdle or embroidery at the foot.

Surrey (sur'ri), a county of England, bounded by the Thames, separating it from Buckinghamshire and Middlesex; by Kent, Sussex, Hamp-

shire, and Berkshire; area, 707 sq. miles. A range of hills, called the North Downs, stretches across the county from east to west, sloping gently down towards the Thames on the north, and on the south descending precipitously to the Weald, a flat plain which extends into Kent and Sussex. The highest point in the county is Leith Hill, 993 feet, about 3 miles south of Dorking. Almost the whole of the county is drained by the Thames, with its tributaries the Wey, Mole, and Wandle. A large portion of the soil is under tillage, though extensive areas are covered with heath. In the N. a great part of the land is devoted to vegetable gardens for the London supply, and other farms to the raising of medical and aromatic plants. The vicinity of the metropolis, and the beautiful sites which it affords, have caused many parts of Surrey to be studded over with mansions and villas. The county contains the metropolitan parliamentary boroughs of Battersea and Clapham, Camberwell, Lambeth, Newington, Southwark and Wandsworth. The county town is Guildford. Pop. 930,377, many of whom are included within the limits of London.

Surrey. See *Howard, Family of.*

Surrey, HENRY HOWARD, EARL OF, English poet, born about 1516, was the grandson of the Earl of Surrey who was the victor at Flodden, and who, as a reward for his services, was created Duke of Norfolk. He succeeded to the courtesy title of Earl of Surrey when his father became second Duke of Norfolk in 1524. The Howards held an eminent position at the court of Henry VIII, and Surrey's cousin, Catherine Howard, became the king's fifth wife. Shortly before Henry's death Surrey and his father were suspected of aiming at the throne, and were arrested and lodged in the Tower, and Surrey was tried, condemned, and executed on Tower Hill, Jan. 19, 1547. Surrey was one of the leaders of the early poetic movement under Henry VIII. Most of his poems were translations or adaptations of Italian originals. His translations of the second and fourth books of the *Æneid* are the first attempt at blank verse in the English language.

Surrogate (sur'u-gāt), in Britain the deputy of a bishop or ecclesiastical judge. His chief duty is the granting of marriage licenses. In certain of the United States an officer exercising supervision over the probate of wills.

Surturbrand (sur'tur-brand), fossil wood, impregnated more or less with bitumen, found in great abundance in Iceland. It is used by the Icelanders chiefly in their smithies. It is sometimes so little mineralized as to be employed for timber.

Surveying (sur-vā'ing), the art of measuring the angular and linear distances of objects on the surface of the earth, so as to be able to delineate their several positions on paper, to ascertain the superficial area, or space between them, and to draw an accurate plan of any piece of ground in more or less detail. It is a branch of applied mathematics, and is of two kinds, land surveying and marine surveying, the former having generally in view the measurement and delineation on paper of certain tracts of land, and the latter the laying down of the position of beacons, shoals, coasts, etc. Those extensive operations of surveying which have for their object the determination of the latitude and longitude of places, and the length of terrestrial arcs in different latitudes, are frequently called *trigonometrical surveys*, or *geodetic operations*, and the science itself *geodesy*. In land-surveying various instruments are used, the most indispensable of which are Gunter's chain, for taking the linear dimensions when the area of the land is required; the theodolite, for measuring angles; and the surveyor's cross, or cross-staff, for raising perpendiculars. See *Geodesy* and *Trigonometrical Survey.*

Survival of the Fittest. See *Natural Selection.*

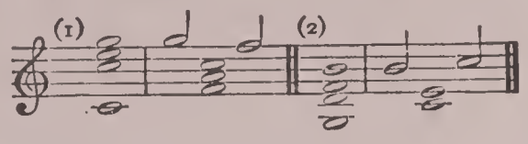
Susa (sö'sȧ), an ancient city of Persia, the capital of the province of Susiana, or Elam, was situated in the plain between the Kerkha (Choaspes) and the Dizful. It was a very extensive city, with a strongly fortified citadel, containing the palace and treasury of the Persian kings, whose chief residence it was from the time of Darius I. It is the Shushan of the book of Daniel, where it is mentioned as situated on the banks of the river Ulai or Eulæus. The plain of Susa is covered with extensive mounds, in which fragments of brick and pottery with cuneiform inscriptions are found, and important discoveries have been made by Dr. Loftus, and more recently by M. Dieulafoy.

Susa (ancient *Hadrumetum*), a seaport of Tunis, on the Gulf of Hamáma, 45 miles from Kairwan. It has a rapidly increasing trade; exports oil, grain, esparto. Pop. about 27,000, including 6000 Europeans.

Susannah (sö-zan'a), BOOK OF, is one of the apocryphal ad-

ditions to the book of Daniel which are found in the Greek versions of Theodotian and the Seventy. They have not been found in any Hebrew original, and are generally rejected by the Jews.

Suspension (sus-pen'shun), in music, the prolongation of a note in a chord, having the effect of suspending for a moment certain notes in the



Suspension (1) from above; (2) from below.

following chord; or the delay of a dissonance in reaching the chord into which it is to be resolved.

Suspension-bridge. See *Bridge.*

Susquehanna (sus-kwe-han'nȧ), a river of the United States, formed by two branches, an eastern or northern branch, 250 miles long from Lake Otsego in New York, and a western branch, 200 miles from the western slope of the Alleghenies. These unite at Northumberland in Pennsylvania. The united stream flows south and southeast, and after a course of 150 miles reaches the head of Chesapeake Bay at Port Deposit, Maryland. It is a wide but shallow stream, nowhere navigable to any extent, save in the spring. Many dams exist along its course, the most important being the great McCall dam on the lower Susquehanna for the development of electric power. This is transmitted to Baltimore and may soon be extended to other cities.

Sussex, a southern maritime county of England, bounded north by Surrey, north and northeast by Kent, southeast and south by the English Channel, and west and northwest by Hants; area, about 1459 sq. miles. The great physical feature of the county is the range of chalk hills known as the South Downs, which traverse the county from the Hants border, near Petersfield, to the bold promontory of Beachy Head. They are chiefly used for sheep pasture, and the breed for which the county is famed is known as the 'Southdowns.' Much of the remainder of the county is devoted to agriculture, grain and hay being the leading crops. Among the mineral products is 'Sussex' marble, a kind of limestone containing fresh-water shells, which admits of being cut and polished. The mildness and equableness of the climate along the southern coast has led to the growth of numerous health resorts and watering or bathing places, the most famous of these being Brighton. The county is rich in archæological remains, among which are the castles of Pevensey, Bodiam, Hastings, etc. Pop. (1911) 663,416; (1921) 728,001.

Susuk, Soosook, Susu, the dolphin of the Ganges, about 8 feet in length, and with a long snout.

Sutherland (su*th*'ėr-land), George, an American senator and jurist, born in Buckinghamshire, Eng., March 25, 1862; came to U. S. in 1864. Admitted to the bar in 1883, he practiced law in Salt Lake City. He was United States senator, 1905-11 and 1911-17; associated justice United States Supreme Court, 1922.

Sutherland (su*th*'ėr-land), a maritime county in the north of Scotland, bounded north and west by the Atlantic, south by Ross and Cromarty, east by the North Sea and Caithness; area, 2028 sq. miles. On the northern and western sides the coast is remarkable for the loftiness and boldness of its precipices, and its deep indentations by numerous lochs or arms of the sea; but the east coast is generally flat and continuous, with sandy shores. The interior consists of a succession of lofty and rugged mountains, rising in Ben More to 3273 feet. There are valuable salmon fisheries in several of the rivers, game of all kinds is abundant, and there are extensive deer forests. The herring-fishery is important. It is the most sparsely populated county in Scotland. Pop 21,440.

Sutlej (sut'lej), a river of Northern Hindustan, one of the 'five rivers' of the Punjab, has its source in Tibet, in a lake at an elevation of 15,200 feet, and pierces the Himálayas through a gorge with heights of 20,000 feet on either side. Thence it flows southwest, forming the eastern boundary of the Punjab, and enters the Indus at Mithankot after a total course of about 900 miles. In the latter part of its course, after its junction with the united stream of the Jhelum, Chenab, and Ravi, it bears the name of the Panjnad.

Sutler (sut'ler), a person who follows an army and sells to the troops provisions, liquors, or the like. The sutlers attached to regiments in the French army are called *vivandiers.*

Sutras (sö'tras; Sanskrit 'threads'), in Sanskrit literature, the name given to the numerous series of religious aphorisms and rules, including all the ritual, grammatical, metrical, and philosophical works, and consisting of brief sentences to be committed to memory. These were usually written on

dried palm-leaves tied together by a string.

Sutro (sö'tro), ADOLPH HEINRICH JOSEPH, an American mining engineer, born at Aix-la-Chapelle, April 29, 1830; removed to the United States in 1850, and in 1860 devised a tunnel to drain and ventilate the Comstock mines in Nevada. After 9 years of preliminary effort, this work was begun in 1869 and completed at a cost of about $4,000,000. He subsequently acquired a large fortune by real estate operations in San Francisco, and gave large sums of money to public institutions, among them the Sutro library, founded by him. He was elected mayor of San Francisco in 1894. He died August 8, 1898, leaving nearly his entire fortune by will to the city, but the will was contested and broken.

Suttee (su-tē'; Sanskrit, *satī*, an excellent wife), a term applied by the English to the self-immolation of Indian widows on the funeral pyres of their husbands. The origin of this practice is of considerable antiquity, but it is not enjoined by the laws of Manu, nor is it based on the Vedas. It was abolished by Lord Bentinck in 1829, but cases are still occasionally heard of.

Suttner (söt'nėr), BARONESS VON [BERTHA VON KINSKY], an Austrian novelist, wife of Baron von Suttner, born at Prague, Austria, June 9, 1843; died June 21, 1914. In 1891 she founded the Austrian Society of Peace-Lovers, and as its president took part in the peace congresses at Rome, Bern, Antwerp and Hamburg. She wrote a number of novels including *Die Waffen Nieder* (*Lay Down Your Arms*) for which she was awarded the Nobel peace prize in 1905.

Sutton Coldfield, an ancient market-town and now a municipal borough of England, in Warwickshire, 7 miles northeast of Birmingham. Pop. (1921), 23,028.

Sutton in Ashfield, an ancient market-town of England, in Nottinghamshire, 3 miles southwest of Mansfield. There are manufactures and in the vicinity are collieries and lime-works. Pop. (1921) 23,852.

Suvalki (sö-väl'kē), a town of Poland, on a tributary of the Niemen, 152 miles N. E. of Warsaw. It was taken by German troops in 1915. Pop. 33,000.

Suvorof-Rimnikski (sö-vå ' rov), PETER ALEXIS VASILIEVICH (his name is also spelled *Suwarof*, *Suwarrow*, etc.), COUNT OF, Prince Italiski, field-marshal and generalissimo of the Russian armies, was born about 1729 or 1730, and in his seventeenth year entered the service as a common soldier. He served in the war against Sweden, in the Seven Years' war, in Poland, and against the Turks, giving many proofs of courage and conduct, and obtaining the rank of lieutenant in 1754, of lieutenant-colonel in 1763, of brigadier-general in 1768, and of general of division in 1773. In 1783 he reduced the Kuban Tartars under the Russian yoke. In 1787, as chief in command, he conducted the defense of Kinburn to a successful issue; and in 1789 he gained the dignity of count by his great victory on the banks of the Rimnik, where the Austrian troops, under the Prince of Saxe-Coburg, were surrounded by 100,000 Turks. By his timely arrival with 10,000 Russians he not only rescued the Austrians, but occasioned the utter overthrow of the enemy. The next, and perhaps the most sanguinary of his actions, was the storming of Ismail in 1790, which was followed by the indiscriminate massacre of 40,000 of the inhabitants of every age and both sexes. He was next employed against the Kingdom of Poland, and conducted a campaign of which the partition of the country was the result, receiving a field-marshal's baton, and an estate in the dominions which he had helped to annex to the Russian crown. The last and most celebrated of his services was his campaign in Italy in 1799, when his courage and genius for a while repaired the disasters of the allied forces. He gained several brilliant victories at Piacenza, Novi, etc., drove the French from all the towns and fortresses of Upper Italy, and as rewarded with the title of Prince Italiski. But in consequence of a change in the plan of operations he passed the Alps; and the defeat of Korsakof at Zürich, together with the failure of the expected assistance from the Austrians, obliged him to retreat from Switzerland. On his recall to Russia, preparations were made for his triumphal entry into St. Petersburg; but having incurred the displeasure of the Emperor Paul the preparations for his triumph were suspended. Chagrin at this disgrace hastened his death, which took place May 18, 1800.

Suwarrow Islands, a group of three low wooded islands in the Pacific, about 450 miles N. N. W. of Cook or Hervey Islands, and about the same distance E. of Samoa. Annexed to Great Britain in 1889.

Suzerain (sū'ze-rān), in feudalism, a lord paramount; either the king, as original holder of the realm,

or his immediate vassals, as grantors in turn to sub-vassals.

Svastika (svas'ti-ka), a religious symbol used by early races of Aryan stock from Scandinavia to Persia and India. It consists of a Greek cross, either enclosed in a circle the circumference of which passes through its extremities or with its arm bent back, and was intended to represent the sun, being found invariably associated with the worship of Aryan sun gods (Apollo, Odin). Similar devices occur in the monumental remains of the ancient Mexicans and Peruvians, and on objects exhumed from the prehistoric burial mounds of the United States.

Svendsen (svend'sen), JOHAN SEVERIN, a Norwegian composer, born at Christiania in 1840; became conductor of the musical association in Christiania and in 1883 court conductor at Copenhagen. He has composed a symphony and other orchestral works, chamber music, concertos for violin and violoncello, and songs.

Sverdrup (sver'dröp), OTTO, a Norwegian explorer, born in 1855. He accompanied Nansen on his Greenland expedition in 1888 and was captain of the *Fram* when the latter proved the existence of the polar drift. On the second expedition with the *Fram* he discovered several islands between Greenland and the Parry Isles and Melville Island, described in his work *New Land*.

Swabia. See *Suabia*.

Swahili. See *Suaheli*.

Swallow (swol'ō), the general name for all the insessorial birds of the family *Hirundinidæ*, distinguished by their narrow, elongated wings, their short, broad beak, their wide gape, their comparatively small and weak legs and feet, and their habit of hawking on the wing for insects, which constitute their food. They are found all over the world except in the coldest regions, and there are a number of species. Swallows bear much resemblance to swifts (which see), and among the swifts are several forms which are popularly named 'swallows.' Thus the bird known in the United States as the chimney swallow is not a true swallow, but a swift (*Chætūra pelagica*). Of true swallows, however, several are American, and among them the barn swallow (*Hirundo erythrogaster*), very similar to the European chimney swallow, the purple martin (*Progne subis*), and the cliff swallow (*Petrochelīdon lunifrons*). Three are British, the common or chimney swallow (*Hirundo rustica*), the house-martin (*H. urbica*), and the sand-martin (*H.* or *Cotile riparia*). The name of 'sea swallow' is given to the tern (which see). See also *Martin, Sand-martin*.

Swallow-tailed Butterfly and Moth, names given to the *Papilio Machaon*, a beautiful species of butterflies, and to the *Durapteryx sambucaria*, a common moth, so called because the hinder wings are prolonged into small tails.

Swallow-wort. See *Celandine*.

Swammerdam (swåm'er-dåm), JOHN, one of the most eminent Dutch naturalists of the seventeenth century, was born at Amsterdam in 1637, and was destined for the church, but embraced the profession of medicine. He was devoted especially to the study of insects; and his *General History of Insects* and other works laid the foundations of the modern science of entomology. He died in 1680.

Swampscott (swamp'skot), a town in Essex Co., Massachusetts, adjoining Lynn, 13 miles N. E. of Boston, on Massachusetts Bay. It is a residential town. Pop. (1920) 8101.

Swan (swon; *Cygnus*), a genus of swimming birds, family Cygnidæ, distinguished as a group by the bill being of equal length with the head, and broad throughout its length; by the *cere* being soft; by the front toes being strongly webbed, while the hinder toe is not webbed, and has no lobe or underskin. The species which inhabit or visit Europe are the mute or tame swan (*C. olor* or *mansuētus*), the whooper, whistling, or wild swan (*C. musicus* or *ferus*), and Bewick's swan (*C. Bewickii*). They have their representatives in North America in the trumpeter swan (*C. buccinātor*), and the *C. columbianus* or *americanus*. South America produces one very distinct species, the beautiful black-necked swan (*C. nigricollis*). The black swan (*C. atrātus*) of Australia, like the white swan, is frequently kept as an ornament in parks or pleasure grounds. Its large size, and the gracefulness of its form and motions, render the swan one of the most ornamental of all the water-birds. In England, from a very early date, it has been specially protected by both legal and regal interference. In Henry VII's reign the theft of a swan's egg was deemed an offense punishable by a year's imprisonment. Swans themselves, at a prior date, were declared to be exclusively 'royal' or 'king's' property; and no subject was

entitled to hold possession of these birds, save under special favor from the sovereign. To such subjects as possessed the permission to keep swans a special or 'swan' mark was attached, and this mark was cut on the bill of the bird as a distinctive badge of ownership. The process of marking is known as 'swan-upping' or 'hopping,' and the ceremony is yet annually carried out on the Thames on behalf of the crown, the universities of Oxford and Cambridge, and several of the London guilds or companies.

Swanevelt (swä'ne-velt), HERMANN, landscape-painter of the Dutch school, born about 1618. He set out for Italy when very young, and, captivated by the pictures of Claude Lorraine, became a scholar of this famous master. He died at Paris in 1655.

Swan River, a river in Western Australia, which colony was originally known as the 'Swan River Settlement.' Perth, the capital of the colony, is on the Swan River, and Fremantle is at its mouth.

Swansdown (swons'down), a name for a fine, soft, thick woolen cloth; or more commonly for a thick cotton cloth with a soft nap on one side.

Swansea (swon'sē; Welsh, *Abertawe*), a seaport town of Wales, Gower Peninsula, county of Glamorgan, at the mouth of the river Tawe, at its entrance into Swansea Bay, Bristol Channel. The ancient town consisted of a few narrow streets at the mouth of the river with a Norman castle, which is still an object of interest. The modern town faces the bay. Copper-works were first established in 1719, and Swansea is now one of the most important copper-smelting centers of the world, and is the chief seat of the British tin-plate industry. Copper ore is imported from all parts of the world, and in the neighborhood is abundant coal for smelting. There are also iron-works, steel-works, zinc-works, alkali-works, etc. Pop. 114,673.

Swarthmore College, a co-educational college at Swarthmore, Pa., 12 miles W. S. W. of Philadelphia, founded in 1864 as a school for the children of Friends. In 1922 there were 53 instructors, 510 students, and a library of 40,000 volumes.

Swatow (swä-tou'), a port of China, in the province of Kwang-tung, at the mouth of the Han River. It is entirely of modern origin, being built on ground recently recovered from the sea. It was opened to foreign commerce in 1869. The chief trade is with Hong-Kong. The principal exports are tea, oranges, and the grass-cloth and pine-apple cloth made in the town and district. Swatow has also manufactures of bean-cake and sugar refining. Pop. 38,000.

Swaziland (swä'zē-land), a small country in South Africa, lying between the Transvaal, Zululand, and Amatongaland; area, 6536 square miles. It is a mountainous country, with fertile valleys, and great mineral wealth, especially of gold and coal. The Swazis are a section of the Zulu race, but have always been firm allies of the British In 1894 Swaziland became a dependency of the South African Republic, and after the Transvaal war fell under British control, though the native dynasty is allowed to remain in nominal possession of the government. Pop. 85,484, of whom less than 1000 are Europeans.

Sweaborg, or SVEABORG (svā-å-borg'), a fortress of Russia, in Finland, on seven small islands off the harbor of Helsingfors. It is the seat of a great naval harbor and arsenal. In 1855 it was bombarded by the British and French fleets.

Sweat (swet). See *Perspiration.*

Sweating Sickness, in medicine, a febrile epidemic disease of extraordinary malignity which prevailed in England towards the end of the fifteenth century and the beginning of the sixteenth, and spread very extensively over the Continent. It appears to have spared no age or condition, but is said to have attacked more particularly persons in high health, of middle age, and of the better class. Its attack was very sudden, and the patient was frequently carried off in one, two, or three hours. It seems to have first appeared in the army of the Earl of Richmond upon his landing at Milford Haven in 1485, and soon spread to London. It broke out in England four times after this, in 1506, 1517, 1528, and 1551. The process eventually adopted for its cure was to promote perspiration and carefully avoid exposure to cold.

Sweating System, the system by which subcontractors undertake to do work in their own houses or small workshops, and employ others to do it, making a profit for themselves by the difference between the contract prices and the wages they pay their assistants. The object of the subcontractor or sweater being to secure as large a margin of profit as possible, the tendency of the system is to grind the workers down to the lowest possible limit. It exists in the large cities of

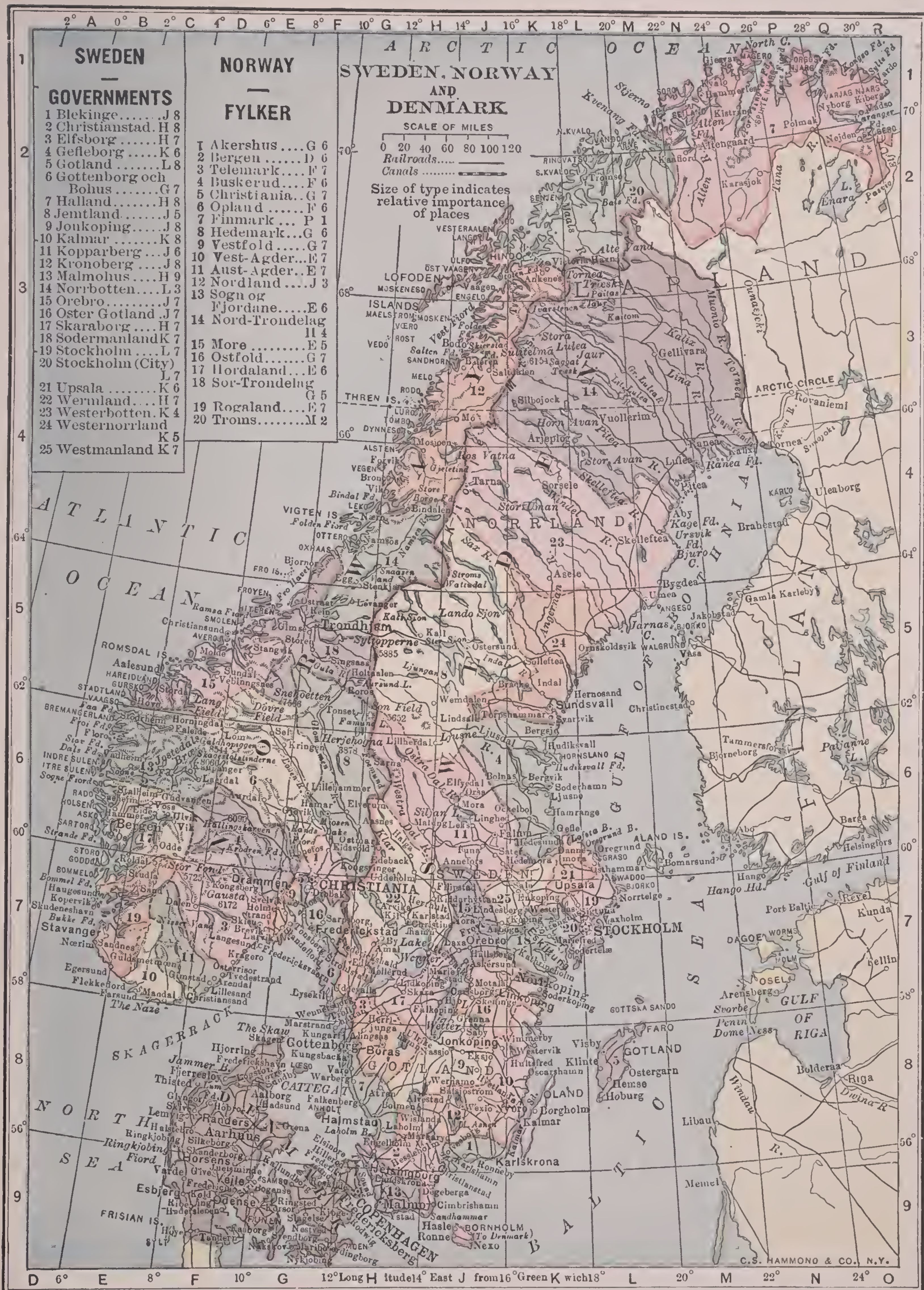
Britain and the United States, and is an evil, in its mode of operation, that calls for close supervision. Various investigations of this system have been made, but much needs to be done to bring it under proper control.

Sweden (swē'den; Swedish, *Sverige*), a kingdom of the north of Europe, until 1905 united with Norway under one monarchy. It is bounded north and west by Norway; southwest by the Skager-Rack, Kattegat, and Sound; south by the Baltic; east by the Baltic and the Gulf of Bothnia; and northeast by the Torneå and its affluent Muonio, separating it from Finland. It consists of the three great divisions of Swealand or Sweden Proper in the middle, Götland or Gottland in the south, and Norrland in the north. For administrative purposes it is divided into twenty-five läns or governments. The total area is 175,035 sq. miles; the estimated population in 1918 was 5,813,850. The population of Sweden is mainly rural. The capital is Stockholm (pop. 408,500); other large cities are Göteborg or Gottenburg, Malmö, Norrköping, Karlskrona, etc. Nearly 2,500,000 of the population are agricultural; about a quarter of a million are cultivators of their own land.

Physical Features.— The coast-line of Sweden, more than 1400 miles in length, is serrated rather than deeply indented. The west coast is very rocky, but seldom rises so high as 30 feet. Along the south and southeast coast low shores alternate with precipitous cliffs, which, however, are of no great elevation. A great number of islets are scattered near the shores. There are also two islands of some size: Oeland near the southeast coast, and Gothland further out in the Baltic. The whole of the upper part of the shore of the Gulf of Bothnia consists of sandy alluvial deposits. The interior has far less of a highland than of a lowland character. From the mountains or elevated masses which run along the frontiers of Norway, with summits that rise more than 6000 feet above sea-level (Sarjek is 6972 feet), the country slopes east towards the Gulf of Bothnia, and south to the shores of the magnificent lakes which stretch almost continuously across the country east to west near lat. 59° N. South of the lakes the country is generally flat, and covered by barren sand or stunted heath, though interspersed with forests, green meadows, and corn-fields. The Plain of Scania, occupying the whole of the south peninsula between the Sound on the west and the Baltic on the south and east, is generally a fine tract of land. The rivers and lakes are very numerous. The rivers all belong to the basins of the Baltic Sea and the German Ocean. To the former belong the Torneå, the Luleå, Umeå, the Angermann, the Liusne, and the united Eastern and Western Dal. The principal rivers belonging to the basin of the German Ocean are the Klar and the Göta. In general the rivers are too rocky for navigation, and the chief natural means of internal communication are supplied by the lakes, the chief of which are Lake Wener (area, 2014 square miles), Lake Wetter (715 square miles), and Lake Mälar, which has the capital on its shores, and is also remarkable for the number of islands which crowd its surface. Numerous canals connect the lakes and rivers and greatly facilitate inland navigation. Almost the whole of the country is composed of gneiss, partially penetrated by granite. The chief mineral is iron, which is produced in large quantities, of excellent quality, admirably adapted for steel. Zinc, copper, and silver, are also raised. Coal is worked in the south, but is poor in quality. Mining, and especially iron-mining, is one of the most important of Swedish industries. Roughly speaking, the mining region occupies the central part of the country, with the forest region to the north, and the agricultural region to the south.

Climate, Fauna, etc.— There is hardly any spring or autumn intervening between the heat of summer and the cold of winter, which in the north lasts for nine, and in the south for seven months. The extremes of heat and cold are much greater than in Britain; but on the whole the climate is eminently favorable to health, and no country furnishes more numerous instances of longevity. Among the larger wild animals are the wolf, the bear, the elk, the red and roe deer, the lynx, glutton, fox, and even the beaver. Of the smaller animals the most destructive is the lemming. Among birds the most remarkable are eagles, the eagle-owl, and the capercailzie. The rivers and lakes are well stocked with salmon and trout.

Agriculture, Manufactures, and Trade. — Of the total land area, nearly 8 per cent. is under cultivation, nearly 5 per cent. under natural meadows, and 44 per cent. under forests, especially pine and fir. Timber is the chief export. Of the cereal crops the principal is oats, considerable quantities of which are exported. Other cereal crops are barley and rye, wheat being cultivated to a comparatively small extent. Large quantities of wheat and flour are imported.


SWEDEN, NORWAY AND DENMARK
SCALE OF MILES
0 20 40 60 80 100 120
Railroads
Canals
Size of type indicates relative importance of places
SWEDEN — GOVERNMENTS
1 Blekinge.......J 8
2 Christianstad. H 8
3 Elfsborg......H 7
4 Gefleborg.....K 6
5 Gotland.......L 8
6 Gottenborg och Bohus.......G 7
7 Halland.......H 8
8 Jemtland.......J 5
9 Jonkoping.....J 8
10 Kalmar.......K 8
11 Kopparberg...J 6
12 Kronoberg....J 8
13 Malmohus....H 9
14 Norrbotten....L 3
15 Orebro.........J 7
16 Oster Gotland .J 7
17 Skaraborg....H 7
18 Sodermanland K 7
19 Stockholm....L 7
20 Stockholm (City) L 7
21 Upsala........K 6
22 Wermland....H 7
23 Westerbotten. K 4
24 Westernorrland K 5
25 Westmanland K 7
NORWAY — FYLKER
1 Akershus....G 6
2 Bergen......D 6
3 Telemark....F 7
4 Buskerud....F 6
5 Christiania..G 7
6 Opland......F 6
7 Finmark... P 1
8 Hedemark...G 6
9 Vestfold.....G 7
10 Vest-Agder...E 7
11 Aust-Agder..E 7
12 Nordland....J 3
13 Sogn og Fjordane.....E 6
14 Nord-Trondelag H 4
15 More.........E 5
16 Ostfold.......G 7
17 Hordaland...E 6
18 Sor-Trondelag G 5
19 Rogaland....E 7
20 Troms........M 2
ARCTIC OCEAN
ATLANTIC OCEAN
NORTH SEA
SKAGERRACK
CATTEGAT
BALTIC SEA
GULF OF BOTHNIA
GULF OF RIGA
Gulf of Finland
LAPLAND
FINLAND
NORRLAND
SWEDEN
NORWAY
ARCTIC CIRCLE
LOFODEN ISLANDS
GOTLAND
OLAND
BORNHOLM
CHRISTIANIA
STOCKHOLM
COPENHAGEN
Trondhjem
Bergen
Stavanger
Gottenborg
Malmo
Upsala
Sundsvall
Helsingfors
Riga
12° Longitude 14° East from 16° Greenwich 18°
C.S. HAMMOND & CO. N.Y.

The potato is grown everywhere. The principal domestic animals are cattle, sheep, horses, swine, and reindeer. The last, necessarily confined to the north, are kept in large herds by the Laplanders, and supply them at once with food and clothing. The manufacturing industries include those connected with iron, steel, wooden goods, woolens, cottons, silks, refined sugar, leather, paper, spirits, etc. The greater part of the trade is with Great Britain and Germany. The chief denomination of money is the krona = 26.8 cents.

People.— The inhabitants of Sweden, with the exception of the Laplanders and Finns, found only in the north, belong to the Scandinavian branch of the Teutonic family, and are characterized by a tall robust stature, light hair, blue eyes, and light complexions. The Lutheran faith is recognized as the state religion, but recently there have been extensive secessions from the Established Church. Other religions are tolerated; but appointments in the public service can be held by Lutherans only. Elementary education is gratuitous and compulsory, and almost every person can read and write. There are two universities, at Upsala and Lund.

Government, etc.— The crown is hereditary in the male line. The king must be a member of the Lutheran Church, and has to swear fidelity to the laws of the land. His prerogatives consist of the right to preside in the high court of justice, to grant pardons, to conclude treaties with foreign powers, to declare war and peace, to nominate to all appointments civil and military, and to veto absolutely any decree of the Diet. He also possesses legislative power in matters of political administration, but in all other matters that power is exercised, in concert with the sovereign, by the Diet, in which is invested the right of imposing taxes. The Diet or Parliament consists of two chambers. The first chamber contains 150 members, elected by the twenty-five provincial landstings or constituencies, and the municipal corporations of Stockholm, Göteborg, Malmö, and Norrköping. They are elected for nine years, and serve gratuitously. The second chamber contains 230 members, elected for three years, and paid for their services. The executive power is in the hands of the king, under the advice of a council of state consisting of ten members, seven of whom are departmental heads. Affairs common to Sweden and Norway are administered by a council of state, on which both the kingdoms are represented. About a third of the revenue is derived from direct taxes and from national property, including railways; the remainder from customs, excise, and other indirect taxes. The total estimated revenue for 1910 was $57,000,000, and the expenditure practically the same amount. The public debt amounted to $131,600,000. The army comprises a nominal total of 328,000 men, the majority raised by conscription, by annual levy from among men between the ages of 21 and 32. The navy consists of 5 modern and 7 older battleships, 1 cruiser, 11 monitors, 51 torpedo boats, 6 destroyers, and 10 submarines.

History.— The early history of Sweden is obscure. Christianity was introduced about the beginning of the eleventh century. Sweden was more or less an appanage of the Danish crown until the time of Gustavus Vasa, who raised the peasants of Dalecarlia, defeated the Danes, was elected to the throne in 1523, and received authority to reorganize the church on the basis of Lutheranism in 1527. (See *Gustavus I.*) — His son, Erik XIV, reigned only eight years, when, having lost his reason, he was deposed. He was succeeded by his brother, John III, who endeavored to restore the Catholic religion in Sweden, in which, however, he failed. He died in 1592, and was succeeded by his son, Sigismund, who in 1587 had been elected king of Poland. Sigismund had been brought up in the Catholic faith, but before his coronation had promised to support Protestantism in Sweden. Failing to comply, he and his posterity were excluded from the crown, which was conferred in 1604 upon his uncle, Charles IX, who died in 1611, and was succeeded by his son, the celebrated Gustavus Adolphus. (See *Gustavus II.*) Sweden, which, notwithstanding internal troubles, had been advancing in political importance since the time of Gustavus Vasa, now became the leading power of the North; and under Gustavus Adolphus, who espoused the cause of Protestantism in the Thirty Years' war, took for the first time a leading part in the affairs of Europe. Gustavus Adolphus met his death at the battle of Lützen in 1632, and was succeeded by his daughter Christina, who renounced the crown in 1654 in favor of her cousin Charles Gustavus, son of the count palatine. (See *Christina.*) The short reign of Charles X was distinguished by some brilliant military enterprises, which extended to Poland, Prussia, Russia, and Denmark. He died suddenly in 1660,

leaving a son, Charles XI, only four years of age. The country was then for long under a council of regency, and carried on a protracted war with Denmark. Charles assumed the government in 1680. He organized the army, adopting a regular system of conscription, and restored the finances. He died in 1697, and was succeeded by his son, the celebrated Charles XII. Of the warlike monarchs of Sweden he is the one who has attained the highest reputation for military genius. (See *Charles XII.*) His career of conquest ended in the disastrous battle of Poltava, July 8, 1709, which compelled Sweden to yield the presidency among the northern states to Russia, and he was killed at the siege of Frederickshall, November 30, 1718, while pushing the conquest of Norway. He was succeeded by his second sister, Ulrica Eleonora, who in 1720 associated with her in the government her husband Frederick I. Sweden was now under the hands of an oligarchy, the chief power in the state being held by a secret council of 100 members: 50 of the order of nobles, 25 of the clergy, and 25 of the burghers. This council was divided into two factions, called (after 1738) the Hats and Caps, the former of which preferred to sell themselves to France, the latter to Russia. On the death of Frederick in 1751 Adolphus Frederick of Holstein-Gottorp, by the influence of Russia, was elected king. During his reign the country was distracted by the rivalries of the Hats and Caps, and the royal power sank to a shadow. Adolphus died in 1771, and was succeeded by his son, Gustavus III, whose reign was distinguished by a monarchical revolution. (See *Gustavus III.*) He was assassinated in 1792. His son, Gustavus IV, was deposed, and his family declared for ever incapable of succeeding to the crown, in 1809. (See *Gustavus IV.*) His uncle, the Duke of Sudermania, was declared king with the title of Charles XIII. (See *Charles XIII.*) In 1810 the Diet elected Jean Baptiste Bernadotte, one of Napoleon's marshals, crown-prince. (See *Bernadotte.*) In the final struggle with Napoleon previous to 1814 Sweden joined the allies, while Denmark took the part of France. The Danes were driven out of Holstein by Bernadotte, and the Treaty of Kiel was concluded between Sweden, Denmark, and Great Britain, January 14, 1814. Sweden by this treaty ceded to Denmark her last German possessions in Pomerania, and the Isle of Rügen, while Denmark was compelled to cede Norway to Sweden as a compensation for the loss of Finland, gained by Russia. Sweden now held the whole Scandinavian Peninsula, and had lost all her other European possessions. Bernadotte succeeded to the crown in 1818, under the title of Charles XIV. He died in 1844, and was succeeded by his son, Oscar I, whose reign was singularly peaceful and uneventful. (See *Oscar I.*) He died July 8, 1859, and was succeeded by his son, Charles Louis Eugene, under the title of Charles XV, whose reign was marked by constitutional reforms. In 1866 the States, which from time immemorial had met in four chambers, representing the nobility, clergy, citizens, and peasantry, were reduced to the modern composition of two chambers, an upper and a lower, and the suffrage was extended in 1869. Charles XV died September 18, 1872, and was succeeded by his brother, Oscar II, who had previously served in the navy, and who at once set to work to develop the mercantile marine of his country. In 1905 Norway seceded from the union with Sweden. While under the rule of the Swedish king, it had maintained a separate administration, and now chose a separate king. Oscar died December 8, 1907, and was succeeded by his son, Gustavus (Gustaf) V. See *Norway.*

Language and Literature.— The Swedish language is a descendant of the ancient Norse, the original of the Scandinavian branch of the Germanic tongues, of which the purest representative at the present day is the Icelandic. It is more closely akin to Danish than to Norwegian and Icelandic. Commercial intercourse with the Hanse towns early brought a German influence to bear upon the language, while the services of the church and the training of the clergy subjected it to the influence of Latin. The earliest writings extant are the ancient provincial laws and the earliest ballads, which belong to the thirteenth century. In the fourteenth century translations of the chivalric romances of Southern Europe were introduced, and were followed by Biblical and theological translations and chronicles. The University of Upsala was founded in 1478, and printing was introduced into Stockholm in 1483. During the sixteenth century the literature, influenced by the Reformation, was chiefly polemical. The earliest translation of the New Testament (1526) was by Olaus Petri, whose brother, Laurentius, the first Protestant archbishop of

the kingdom, translated the Old Testament, published in 1541. A Swedish chronicle, *Svensk Krönika*, was written by Olaus and revised by his brother. Olaus also attempted the drama. The Thirty Years' war exercised a very favorable influence on Swedish literature. Several libraries captured by Gustavus Adolphus were sent into Sweden, and his daughter Christina became a liberal patron of literature, and brought many learned men to the country. The seventeenth century was chiefly characterized by the dramas of Messenius, and by the didactic and other poems of Stjernhjelm, 'the father of Swedish poetry' (1598-1672). In the eighteenth century French and English literature had much influence on that of Sweden. Olof von Dalin (1708-63) now took the chief place in verse and prose, other poets being Mrs. Nordenflycht, Creutz, and Gyllenborg. Among the great names of this century in science are those of Swedenborg (1688-1772), Linnæus (1707-78), Torbern Olof Bergman (1735-84), Karl Wilhelm Scheele (1742-86), Celsius (1701-44), Karl Mickel Bellman (1740-95) was a song-writer of great merit. Mörk (1714-63) was the first Swedish novelist. Berzelius (1779-1844), one of the first chemists of his age, belongs essentially to the present century, as do Tegnér (1782-1846), bishop of Vexiö, the greatest name in Swedish literature, whose *Story of Frithiof* was translated into every European language; Frederika Bremer (1801-65), the Finnish poetess, whose stories were popular far beyond Sweden; and Runeberg (1804-77), the poet, who is preferred by many Swedes even to Tegnér. Among recent writers are Zakris Topelius and Count Karl Snoilsky, poets; Abraham Rydberg, novelist and historian; Johan Strindberg, dramatist; and Selma Lagerlöf, and Anna Edgren, both novelists.

Swedenborg (swē'den-borg), EMANUEL, the founder of the New Jerusalem Church, or sect of Swendenborgians, was the son of Jasper Swedberg, bishop of West Gothland, and was born at Stockholm January 29, 1688. His studies embraced mechanics, mathematics, mining, chemistry, physiology, and most of the natural sciences. The period 1710 to 1714 he spent in extended scientific travels through England, Holland, France, and Germany. In 1716 he was appointed assessor extraordinary in the Royal College of Mines by Charles XII, for whom he invented a rolling-machine to transport cannon over the mountains to the siege of Frederickshall. This service, and his treatises on algebra, the value of money, the orbit and position of the earth and planets, and on tides, gained for him the favor of the government, and in 1719 Queen Ulrica raised the Swedberg family to the rank of nobility, upon which occasion the name was changed to Swedenborg. In the discharge of the duties of his office he visited the mines of Sweden, of Saxony, and of Austria and Hungary. A work on the origin of things, followed by a treatise on mining and smelting (*Opera Philosophica et Mineralia*), was published in 1734 (3 vols), and attracted much attention among the scholars of Europe. He increased his stock of knowledge by new travels in 1736-40 in Germany, Holland, France, Italy, and England, and after his return published the *Œconomia Regni Animalis* ('Economy of the Soul-kingdom'), which contains the application of the system of nature, unfolded in his philosophical works, to man. He was first introduced to an intercourse with the spiritual world in detail, according to his own statement, in 1743, at London. The eyes of his inward man, he says, were opened to see heaven, hell, and the world of spirits, in which he conversed, not only with his deceased acquaintances, but with the most distinguished men of antiquity. That he might devote himself more fully to his spiritual intercourse he resigned, in 1747, his office in the College of Mines; but the king still paid him half his salary as a pension. Subsequently he resided much in England and Holland. His theological works, written in Latin between the years 1747 and 1771, found but a limited number of readers; and while he was an object of the deepest veneration and wonder to his few followers, his statements were the more mysterious to the rest of the world because he could not be suspected of dishonesty, and exhibited profound learning, keenness of intellect, and unfeigned piety. His works are very numerous, among the more important of them being the *Arcana Cœlestia*, the *New Jerusalem*, *Angelic Wisdom*, the *Apocalypse Explained*, *Heaven and Hell*, etc. With uninterrupted health he attained the age of eighty-four, and died of apoplexy in London, March 29, 1772.

Swedenborgians (swē-den-bor'gi-anz), the followers of Swedenborg, and particularly the members of what is called the *New Jerusalem Church*, or *New Church*. This body adopts the doctrinal tenets

and methods of Biblical interpretation laid down in the writings of Emanuel Swedenborg. The first attempt at organization took place in London in 1783, when John Flaxman, the sculptor, was among its members. The first church for public worship was opened in Eastcheap, London, in 1788. Many of Wesley's preachers about this time adopted the new faith and helped to spread it widely. Its great apostle, however, was the Rev. John Clowes, rector of St. John's Church, Manchester, who translated most of Swedenborg's writings, and who, while not agreeing that separation from the Establishment was advisable, fostered the many separatist places of worship which sprang up in Lancashire within the sphere of his influence. In 1789 a general conference was held of the various scattered congregations and receivers, which has since 1815 met annually. It possesses one general and six provincial missionary institutions, two foreign missionary committees, a well-endowed college for the training of students for the ministry, and an orphanage. The sect has spread from England to the United States, and possesses numerous and zealous adherents in various other countries. The belief of the Swedenborgians is: that Jesus Christ is God, in whom is a trinity not of persons but essentials, answering to the soul, body, and the operation of these in a man; that the Scriptures contain an internal or spiritual meaning, which is the Word existing in heaven; that the key to this is the correspondence between natural and spiritual things, as between effects and their causes; that man is saved by shunning evils as sins and leading a life according to the ten commandments; that man is a spirit clothed with a natural body for life on earth, and then when he puts it off at death he continues to live as before but in the spiritual world, first in an intermediate state between heaven and hell, but afterwards, when his character whether good or evil becomes harmonious throughout, among his like either in heaven or hell; that the Lord's second coming and the last judgment are spiritual events which have already taken place.

Swedish Turnip. See *Turnip.*

Sweepstakes (swēp'stāks), a gaming transaction, in which a number of persons join in contributing a certain stake, which becomes the property of one or of several of the contributors under certain conditions. Thus, in horse-racing each of the contributors has a horse assigned to him (usually by lot), and the person to whom the winning horse is assigned gains the whole stakes, or the stakes may be divided between two or three who get the two or three horses first in the race.

Sweet-bay. See *Laurel.*

Sweet-bread. See *Pancreas.*

Sweet-briar, or SWEET-BRIER (*Rosa rubiginosa*), a plant naturalized in the United States. It grows wild, but is often planted in hedges and gardens on account of the sweet balsamic smell of its small leaves and flowers. It is also called *eglantine.*

Sweet-flag (*Acŏrus Calămus*), a plant, also called *Sweet-rush,* found in marshy places throughout the northern hemisphere. The leaves are all radical, long, and sword-shaped; the stem bears a lateral, dense, greenish spike of flowers; the root is long, cylindrical, and knotted. The root has a strong aromatic odor, and a warm, pungent, bitterish taste, and has been employed in medicine since the time of Hippocrates. It is used in the preparation of aromatic vinegar, hair-powder, etc.

Sweet-gum, the *Liquidambar styraciflua,* a large North American tree with palmately lobed leaves and globular fruit. The fragrant gum was used by Indians to perfume their smoking mixtures.

Sweet-pea (*Lathŷrus odorātus*), a garden plant belonging to the nat. order Leguminosæ, and the sub-order Papilionaceæ. It is cultivated on account of the beauty of its flowers, which are sweet-scented, and in color purple, rose, white, or variegated.

Sweet-potato (*Batātas edūlis;* nat. order Convolvulaceæ), a plant now cultivated in all the warmer

Sweet-potato (*Batatas edulis*).

parts of the globe. It is a twining or climbing plant, its stems 5 or 6 feet long, trailing on the ground or climbing over shrubs, with heart-shaped leaves 5 or 6 inches long. The roots at times grow to a great size, but the ordinary average is from 3 to 12 pounds. The native country of the plant is a matter of conjecture, but it was first mentioned in the sixteenth century as used by the Indians of Brazil as an article of food. It was introduced into Spain about 1519. The roots were imported into England from the West Indies by way of Spain, and sold as a delicacy. It is the potato of Shakespeare and contemporary writers, the common potato being then scarcely known in Europe. The consumption of the sweet-potato is very large in many parts, including the United States and the warmer parts of America, the East Indies, etc. In favorable conditions the yield in the United States is from 200 to 300 bushels per acre. The taste of the roots is sweetish and agreeable and they are considered superior to the common potato in flesh-forming properties. *P. paniculata*, another species with a wide geographical distribution, is commonly cultivated for food in west-central Africa. Though given the name of sweet potato, this plant has no botanical relation to the common potato.

Sweet-william (*Dianthus barbatus;* nat. order Caryophyllaceæ), a species of pink, an old inhabitant of the flower garden, which has produced numerous varieties. It grows wild in dry and sterile places in middle and southern Europe.

Swell, in music, a gradual increase and decrease of sound; the crescendo and diminuendo combined, marked by the sign <>. Also an arrangement in an organ (and in some harmoniums) whereby the player can increase or diminish the intensity of the sound at will. In the organ it consists of a series of pipes with a separate keyboard, and forming a separate department (called the swell-organ). The loudness or softness of the tone is regulated by opening or shutting, by means of a pedal, a set of slats like a Venetian blind, which forms part of the frame in which the pipes are inclosed.

Sweyn (swān), a king of Denmark, father of Canute the Great. He died in 1014, after having established himself in England, though without being crowned there. See *Denmark* and *Ethelred II.*

Swift, the *Hirundo apus* of Linnæus and *Cypsĕlus apus* or *murarius* of modern ornithologists. Though swifts are like swallows in many respects their structure is almost entirely different, and some naturalists rather class them with the humming-birds or the goat-suckers. The swift has all four toes directed forwards; it is larger than the swallow; its flight is more rapid and steady; and its scream is very different from the twittering of the swallow. It has unusual powers of flight, its weight being most disproportionately small to its extent of wing, the former being scarcely an ounce, the latter 18 inches, the length of the body being about 8 inches. Its color is a somber or sooty black, a whitish patch appear-

Common Swift (*Cypsĕlus apus*).

ing beneath the chin. It builds in holes in the roofs of houses, in towers, or in hollow trees. The *C. melba* or *alpīnus*, a larger species, with the lower parts dusky white, has its home in the mountainous parts of Central and Southern Europe. A common North American swift is the so-called chimney swallow (*Chætura pelagica*), which builds its nest in chimneys. (See *Swallow.*) The swifts or swiftlets of the genus *Collocalia*, which inhabits chiefly the islands of the Indian Ocean from the north of Madagascar eastwards, construct the edible birds'-nests which are used by Chinese epicures in the making of soup. See *Birds-nests.*

Swift, Jonathan, the greatest of English satirists, the posthumous son of Jonathan Swift, an Englishman, steward of the Irish inns of court, was born in Dublin, November 30, 1667, and was educated at Kilkenny and at Trinity College, Dublin. In 1688 he crossed over to England to pay a visit to his mother, who was residing at Leicester, in her native county, in a state of dependence upon her relations. By her advice he communicated his situation to Sir William Temple, who had married one of her relatives, and who

at that time lived in retirement at Moor Park, Surrey. He was received by Sir William into his house as his amanuensis, and was introduced to King William, who often visited Temple privately, and who offered Swift a captaincy of horse, which he declined, having already decided for the church. In July, 1692, he was graduated as M.A. at Oxford, having entered at Hart Hall in the preceding May. In 1694, conceiving his patron to be neglectful of his interest, he parted from him, with some tokens of displeasure on both sides, and went to Ireland, where he took orders; but he soon returned to Sir William Temple, and remained with him during the few remaining years of that statesman's life. On his death Swift found himself benefited by a pecuniary legacy and the bequest of Temple's papers, which he published with a dedication to the king. In 1699 he accepted an invitation from the Earl of Berkeley, one of the lords-justices in Ireland, to accompany him as chaplain and secretary, and was presented by that nobleman with the living of Laracor, where he went to reside in 1700. In 1701 he took his doctor's degree, and in 1704 he published anonymously his famous *Tale of a Tub*, to which was appended the *Battle of the Books*. In 1708 appeared an attack upon astrology under the title of *Predictions for the Year 1708, by Isaac Bickerstaff, Esq.*, and in 1709 a *Project for the Advancement of Religion*, dedicated to Lady Berkeley, the only work to which he ever put his name. In 1710 he was in London, being engaged by the Irish prelacy to obtain a remission of the first-fruits and twentieths, payable by the Irish clergy to the crown, and was introduced to Harley, afterwards Earl of Oxford, and to Secretary St. John, subsequently Lord Bolingbroke. He overtly joined the Tory party, and several political tracts appeared from his pen. The two most famous of these were *The Conduct of the Allies* (1711) and *The Barrier Treaty* (1712), which did immense service to the Tories, preparing the mind of the country for the peace which the ministers were then anxious to bring about. A bishopric in England was the object of his ambition; but the only preferment he obtained from his ministerial friends was the Irish deanery of St. Patrick's, to which he was presented in 1713. The dissensions between Oxford and Bolingbroke, whom he in vain attempted to reconcile, and the death of the queen, which soon followed, put an end to his prospects, and condemned him to unwilling residence for life in a country which he disliked. In 1716 he is said to have been privately married to Miss Esther Johnson, the lady whom he rendered celebrated under the name of Stella; but this is doubted. In 1712 he had become acquainted in London with Miss Hester Vanhomrigh (Vanessa), a lady of fortune, with a taste for literature, in which it was a pleasure to him to give her instruction. The pupil became enamored of her tutor, and even proposed marriage to him; but he avoided a decisive answer. Miss Vanhomrigh died in 1723, of shock, it is said, at discovering his secret union with Stella. *His Proposal for the Universal Use of Irish Manufactures* (1720) and his celebrated *Drapier's Letters* (1723) made him the idol of the Irish people. His famous *Gulliver's Travels* appeared in 1726. After the death of Stella, which took place in 1728, his life became much retired, and the austerity of his temper increased. He continued, however, earnest in his exertions to better the condition of the wretched poor of Ireland; in addition to which he dedicated a third of his income to charity. In later years the faculties of his mind decayed, and by 1742 had entirely given way. He died in 1745, bequeathing the greatest part of his fortune to an hospital for lunatics and idiots. Swift's character was marked by many noble qualities, but was stained by excessive pride, implacability, misanthropy, and general indifference to the feelings of others. As a writer he has, perhaps, never been exceeded in grave irony, which he veils with an air of serious simplicity, admirably calculated to set it off. He abounds in ludicrous ideas, which often deviate, both in his poetry and prose, into very unpardonable grossness. His style forms a fine example of easy familiarity.

Swift, Lewis, astronomer, was born at Clarkson, New York, in 1820. In early life he began the study of magnetism and electricity and after 1855 devoted himself chiefly to astronomy, especially the study of comets. He became director of the Warner Observatory, Rochester, N. Y., in 1882, and subsequently of the Lane Observatory, California. He discovered numerous comets and over 1200 nebulæ. Died in 1912.

Swilly (swil'li), Lough, an inlet of the Atlantic in the north of Ireland, which penetrates the county of Donegal for about 25 miles. It is a fine expanse of great depth, with an average width of 3 miles, but is not much frequented by ships.

Swimming (swim'ing), the act or art of sustaining and propelling the body in water. A large proportion of the animal tribes are furnished with a greater or less capacity for swimming either in water or on its surface, but man is unqualified for swimming without learning to do so as an art. The art of swimming chiefly consists in keeping the head, or at least the mouth, above water, and using the hands and feet as oars and helm. It forms a most healthful, invigorating, and agreeable exercise, and the means which it affords of preserving our lives or those of others in situations of peculiar peril is also a great recommendation of this exercise, which may be easily learned wherever there is water of moderate depth. Want of confidence is the greatest obstacle in the way of most who begin to learn swimming. The beginner cannot persuade himself that the water will support him, and with the feeling that some muscular effort is necessary for the purpose stiffens his back in such a way that the water cannot buoy him up with the head above water. If, instead of doing this, he would give up the endeavor to support himself by muscular strain, and trust to the water to support him like a cushion, the art of swimming would come to him almost as naturally as the art of walking does to a child. When the ability to swim in the ordinary way, chest downwards, is acquired, everything is acquired. It is as unnecessary to give special instructions for swimming on the back, on the side, etc., as it is to direct people who are able to walk how to turn themselves or walk up or down hill. In saving a person from drowning, which can be done most effectually if he has already lost consciousness, pull him by the hair, or push him before you, if far from shore; otherwise take him by the arm. An excellent method of supporting another in the water is to allow the person supported to rest his hands on your hips. This method can scarcely be practiced in cases where persons unable to swim are drowning; but it may be of much avail in supporting a brother swimmer who is attacked with weakness or cramp, and who has presence of mind to take advantage of the support. Several feats of modern swimming have been placed on record, the most famous of all being that of Matthew Webb, of the British mercantile marine service, who swam from Dover to Calais on August 24-25, 1875, in 21 h. 44 m 55s., a distance of 39½ miles. Capt. Webb, who has never been approached as a long-distance swimmer in ocean and tidal waters, lost his life in an attempt to swim the whirlpool rapids of Niagara on July 24, 1883.

Swimming-bladder, Air-bladder, or Sound (of fishes), the names applied to a sac or bladder-like structure found in most, but not in all fishes, the chief office of which appears to consist in altering the specific gravity of the fish, and thus enabling it to rise or sink at will in the surrounding water. It has a *homology* or structural correspondence with the *lungs* of higher forms than fishes; but it has no *analogy* or *functional* correspondence with the lungs or breathing organs, save in the peculiar Lepidosirens (which see) or mud-fishes, in which the air-bladder becomes cellular in structure, and otherwise assumes a lung-like structure and function. In its simplest condition it exists as a closed sac lying beneath the spine, and containing air or gases of different kinds. By the muscular compression of its walls the density of the contained gas is altered, and the specific gravity of the fish affected accordingly, so as to change its position in the water. There is reason to believe that the swimming-bladder is the relic of an air-breathing organ possessed by certain fishes in a remote geological period, which ceased to function as a lung at a later period, vanishing in some cases, becoming the air-bladder in others. That it is essential to the fish as an aid in swimming is rendered very doubtful by its presence in certain fishes and its absence in others of the same genus or family. In most sea-fishes the gas which the swimming-bladder contains is oxygen, that in the air-sac of fresh-water fishes being mostly nitrogen. Such fishes as the flat-fishes, represented by the flounders, soles, etc., have no swimming-bladder developed, and it is absent in other forms, such as sharks, rays, lampreys, etc.

Swinburne (swin'burn), Algernon Charles, poet and essayist, was born at London in 1837, and was educated at Balliol College, Oxford. His first productions, *Queen Mother and Rosamond*, published in 1861, attracted but little attention. They were followed by two tragedies, *Atalanta in Calydon* (1864), and *Chastelard* (1865), and by *Poems and Ballads*, (1866), which excited considerable criticism. After that time Swinburne remained prominently before the public. Among his numerous later works may be mentioned: *A Song of Italy* (1867); *William Blake*, a critical

essay (1867); *Songs of Sunrise* (1871); *Bothwell*, a tragedy (1874); *Notes on Charlotte Brontë* (1877); *A Century of Roundels* (1883); *A Study of Victor Hugo* (1886); a collection of essays and criticisms under the title of *Miscellanies* (1886); a poem on the *Armada* (1888); *Studies in Prose and Poetry* (1894). He died May 10, 1909.

Swindon (swin'dun), a market town of England, in the county of Wilts, 77 miles west of London. It consists of Old Swindon and New Swindon. Old Swindon is a picturesque old place, known in Domesday as Svindune. New Swindon originated in the establishment here, in 1841, of the locomotive works of the Great Western Railway. These works employ several thousand hands. Pop. 50,771.

Swine (swīn). See *Hog*.

Swine Fever, or SWINE PLAGUE, is known as hog cholera in the United States, where it has caused enormous losses. It is a specific contagious fever, generally very rapid in its course, death ensuing in a very few days. To suppress the disease all affected pigs must be killed, and if necessary those which have been in contact with them, and the carcasses and litter burned or deeply buried.

Swine-fish, a name given to the *Anarrhichlas lupus* or sea-wolf (which see).

Swinemünde (svē'nė-mün-dė), a seaport of Prussia, province of Pomerania, on the island of Usedom, at the mouth of the Swine, 36 miles N. N. W. of the town of Stettin, of which it is the foreport. The harbor, which is strongly fortified, is one of the best on the Prussian Baltic coast. The lighthouse is the loftiest in Germany. Swinemünde is much frequented for sea-bathing. Pop. 13,272.

Swing-bridge, called also swivel-bridge and pivot-bridge, a bridge that may be moved by swinging, so as to afford a passage for ships on a river, canal, at the mouth of docks, etc. In one form the whole bridge is swung to one side; in another it rotates from its center on a pier in the middle of the waterway, so as to make a passage on each side of it; while in a third it consists of two sections, each of which, when opened, is landed on its own side.

Swinton (swin'tun), a town of England, in the West Riding of Yorkshire, at the junction of the Dearne and Dove; 10 miles northeast of Sheffield. It is an industrial place, with pottery-works, glass-works, iron-works, coal mines, etc. Pop. (1911) 13,658.

Swinton and Pendlebury, a town of Lancashire, England, 5 miles N. W. of Manchester. Its inhabitants are largely engaged in the industries of cotton-weaving, brick-making, and coal mining. Pop. (1911) 30,759.

Swiss Guards, bodies of mercenary Swiss troops which, after Switzerland gained her independence in the fifteenth century, were employed in many European countries as body-guards, and for duty about courts. The most famous were the French Swiss Guards organized in 1616, and annihilated in the defense of the Tuileries, August 10, 1792, whose heroism is commemorated in Thorwaldsen's colossal *Lion*, carved in the face of a rock at Lucerne. The French Swiss Guards were reorganized by Louis XVIII in 1815, and defeated and dispersed in the revolution of 1830.

Swissvale, a borough of Allegheny Co., Pennsylvania, on the Monongahela River, 8 miles E. S. E. of Pittsburgh. It manufactures railroad switches and signals, lamps, etc. Pop. (1910) 7381; (1920) 10,908.

Switches. See *Railroad*.

Swithin, ST. (swith'un), bishop of Winchester from 852 to 862, and patron saint of Winchester Cathedral from the tenth to the sixteenth century. The popular knowledge of this saint's name is due to the belief that if rain falls on the 15th of July (which is popularly known as St. Swithin's Day) it will rain for six weeks after. Similar superstitions are connected in various continental countries with other saints' days which occur in summer.

Switzerland (swit'zur-land; German, *Schweiz;* French, *Suisse*), a federal republic of Central Europe, bounded north by Baden, from which it is separated for the most part by the Rhine; northeast by Würtemberg and Bavaria, from which it is separated by the Lake of Constance; east by the principality of Lichtenstein and the Tyrol, from which it is separated by the Rhine and the Grisons Alps; south by Italy, from which it is separated by the Alps and the Lake of Geneva; and west and northwest by France, from which it is separated in part by the Jura Mountains and the River Doubs. Greatest length, 210 miles; greatest breadth, 126 miles. The federal cantons of which it consists,

with their areas and populations, are as follows: —

Cantons.	Area in sq. m.	Population.
Aargau (Fr. Argovie)	542	206,498
Appenzell	162	68,780
Basel (Fr. Bâle)	177	180,634
Bern (Fr. Berne)	2 660	589,433
Freiburg (Fr. Fribourg)	644	127,951
Gall, St. (Ger. Sankt Gallen)	780	250,285
Geneva (Fr. Genève; Ger. Genf)	109	132,609
Glarus (Fr. Glaris)	267	32,349
Grisons (Ger. Graubünden)	2 774	104,520
Lucerne (Ger. Luzern)	580	146,514
Neuchâtel (Ger. Neuenburg)	312	126,279
Schaffhausen (Fr. Schaffhouse)	116	41,516
Schwyz (Fr. Schwytz)	351	55,385
Solothurn (Fr. Soleure)	303	100,762
Ticino (Ger. and Fr. Tessin)	1 095	138,638
Thurgau	382	113,221
Unterwalden	295	28,330
Uri	415	19,730
Valais (Ger. Wallis)	2 026	114,438
Vaud (Ger. Waadt)	1 245	281,379
Zug	92	25,093
Zürich	665	431,036
Total	15,992	3,315.443

The 1919 estimated population was 3,937,000. Bern is the capital; other large towns are Geneva, Zürich, Basel.

Physical Features.— The characteristic physical features of Switzerland are its lofty mountain ranges, enormous glaciers, magnificent lakes, and wild romantic valleys. The loftiest mountain-chains belong to the Alps, and are situated chiefly in the south. The central nucleus is Mount St. Gothard, which unites the principal watersheds of Europe, and sends its waters into four large basins — north by the Rhine to the German Ocean, southwest by the Rhone to the Mediterranean, southeast by the Po to the Adriatic, and east by the Danube to the Black Sea. In like manner it forms a kind of starting-point for the loftiest ranges of the Alps — the Helvetian or Lepontine Alps, to which it belongs itself; the Pennine Alps, which include Mont Blanc, the culminating point of Europe, beyond the Swiss frontiers in Savoy; and the Rhætian Alps, which stretch east and northeast across the canton of Grisons into the Tyrol. Besides the Alps, properly so-called, the only range deserving of notice is that of the Jura, which is linked to the Alps by the small range of the Jorat. See *Alps*.

Rivers and Lakes.— Owing to the mountainous nature and inland position of the country none of the rivers acquire such a size within its limits as to become of much navigable importance. The Rhine, formed by two head-streams in the canton of Grisons, flows north into the Lake of Constance, and thence west to Schaffhausen, where it forms the celebrated falls of that name. Below these falls its navigation properly begins. Its principal affluent in Switzerland is the Aar. The Rhone, rising in the Rhone glacier (Valais), flows northwest into the Lake of Geneva. Immediately after issuing from the lake at the town of Geneva it receives the Arve, and about 10 miles below quits the Swiss frontier. The waters which the Po receives from Switzerland are carried to it by the Ticino; those which the Danube receives are carried to it by the Inn. The largest lakes, that of Geneva in the southwest and of Constance in the northeast, as well as that of Maggiore on the south side of the Alps, belong partly to other countries; but within the limits of Switzerland, and not far from its center, are Lake Neuchâtel, with Morat and Bienne in its vicinity, Thun with its feeder Brienz, Lucerne or Vierwaldstätter-see, Sempach, Baldegg, Zug, Zürich, and Wallenstätter-see. All these internal lakes belong to the basin of the Rhine.

Geology and Minerals.— All the loftiest alpine ranges have a nucleus of granite, on which gneiss and mica-slate recline generally at a high angle. Coal-bearing strata are found in the cantons of Valais, Vaud, Freiburg, Bern, and Thurgau, and brown coal is obtained in St. Gall and Zürich. Iron is worked to advantage in several quarters, particularly among the strata connected with the Jura limestone. Rock and common salt are produced to some extent in the cantons of Vaud, Basel, and Aargau. The only other minerals deserving of notice are alabaster and marble, widely diffused; and asphalt, in the Val-de-Travers in the canton of Valais. Mineral springs occur in many quarters.

Climate, Agriculture, etc.— Owing to differences of elevation the climate is extremely variable even in the same localities. As a result of the same cause, few countries in Europe even of larger extent can boast of a more varied vegetation than Switzerland. In regard to vegetation it has been divided into seven regions. The characteristic product of the first is the vine, which grows up to 1700 or 1800 feet above the sea-level. The next is the hilly or lower mountain region, rising to the height of 2800 feet, and characterized by the

luxuriance of its walnut-trees, with good crops of spelt and excellent meadows. The third or upper mountain region, which has its limit at 4000 feet, produces forest timber, more especially beech, and has good crops of barley and oats, and excellent pastures. Above this, and up to the height of 5500 feet, is the fourth or subalpine region, distinguished by its pine forests and maples; here no regular crops are grown. The fifth or lower alpine region, terminating at 6500 feet, is the proper region of alpine pastures. In the sixth or upper alpine region the vegetation becomes more and more stunted, and the variation of the seasons is lost. The seventh or last region is that of perpetual snow. Many parts even of the lower regions of Switzerland are of a stony, sterile nature, but on every side the effects of persevering industry are apparent, and no spot that can be turned to good account is left unoccupied. Of the total area, over 28 per cent. is unproductive; of the productive area nearly 36 per cent. is under grass and meadows. The chief crops are wheat, spelt, rye, oats, and potatoes. The wine produced is mostly of inferior quality. Considerable quantities of fruits are grown. Among domestic animals the first place belongs to the horned cattle, and the dairy products of Switzerland are of most commercial importance, great quantities of cheese and condensed milk being exported. On the higher grounds goats are very numerous. Among wild animals are bears, wolves, chamois, wild boars, stags, badgers, foxes, hares, otters, birds of prey of large dimensions, and many varieties of winged game. The lakes and rivers are well supplied with fish.

Manufactures and Trade.— Of the population about 40 per cent. are dependent on agriculture, and about 34 per cent. on manufacturing industry. Switzerland is thus mainly an agricultural and manufacturing country. The system of peasant proprietorship prevails largely, it being estimated that there are nearly 300,000 peasant proprietors. The principal manufactures are cotton, silk, embroidery, watches and jewelry, machinery and iron, tobacco and wool. Geneva is the chief seat of the watch industry, Basel of the silk industry, and St. Gallen of embroidery. Switzerland being an inland country, has direct commercial intercourse only with the surrounding states; but the trade with other countries, especially Great Britain and the United States, is very important. There is a very complete system of telegraphs and over 3000 miles of railway. The French metric system of money, weights and measures has been generally adopted in Switzerland.

Religion and Education.— Both the Evangelical-reformed Church and the Roman Catholic are national churches in Switzerland, about 59 per cent. of the inhabitants belonging to the former, and 41 per cent. to the latter. There is complete liberty of conscience and creed, but the order of the Jesuits and the societies affiliated to it are not allowed within the confederation. In terms of the constitution of 1874 primary education is secular and compulsory throughout the confederation. For the higher education there are four universities, Basel, Zürich, Geneva, and Bern; the first founded in 1460, and the three others since 1832. There are also academies or incomplete universities at Lausanne and Neuchâtel; a polytechnic school at Zürich; and a military academy at Thun.

Government and Finance.— The cantons of Switzerland are united together as a federal republic for mutual defense, but retain their individual independence in regard to all matters of internal administration. The legislative power of the confederation belongs to a federal assembly, and the executive power to a federal council. The federal assembly is composed of two divisions — the national council, and the state council or senate. The national council is elected every three years by the cantons — one member to each 20,000. Every lay Swiss citizen is eligible. The senate consists of forty-four members — two for each canton. In addition to its legislative functions the federal assembly possesses the exclusive right of concluding treaties of alliance with other countries, declaring war and signing peace, sanctioning the cantonal constitutions, and taking measures regarding neutrality and intervention. A special feature of the legislative system consists in the *Initiative* and *Referendum*, the first enabling the people to draw up and submit laws of their own to the legislature, the second enabling them to accept or reject laws passed by the legislative body. This system has made its way into other countries. The federal council consists of seven members elected for three years by the federal assembly, every citizen who has a vote for the national council being eligible for becoming a member of the federal council. The seven members of the federal council act as chiefs of the seven administrative departments of the republic. The president and vice-president of the federal council

are the chief magistrates of the republic. They are elected by the federal assembly for one year, and are not eligible for reëlection till after the expiry of another year. The federal tribunal, consisting of nine members elected for six years by the federal assembly, decides in the last instance in all matters of dispute between the cantons, or between the cantons and the confederation, and acts in general as high court of appeal. It is divided into a civil and criminal court. For 1910 the estimated revenue was $31,535,000, and expenditure $31,768,000. The public debt on January 1, 1910, amounted to $44,566,000. Each canton has a budget of its own.

Army.—The army consists of a Bundesauszug, or federal army, comprising all men able to bear arms from the age of twenty to thirty-two; and the Landwehr, or militia, comprising all men from the age of thirty-two to forty-four. In 1910 the Auszug (first 13 years' service) had a strength of 136,661, and the Landwehr (12 years' service), 68,113, making a total of 204,774. There is also, by a law of 1887, a Landsturm (300,000 men), in which every citizen between the ages of seventeen and fifty, not otherwise serving, is liable to be called to serve. The Landsturm is to be called out only in time of war.

People.—The Swiss are a mixed people as to race and language. German, French, Italian, and a corrupt kind of Latin called Rhætian or Roumansch, are spoken in different parts. German is spoken by the majority of inhabitants in fifteen cantons, French in five, Italian in one (Ticino), and Roumansch in one (the Grisons). Of the total population 71.4 per cent. speak German, 21.7 per cent. French, 5.3 per cent. Italian, and 1.2 per cent. Roumansch. The Swiss, however, have lived so long in a state of confederation that, apart from these peculiarities of origin and language, they have acquired a decided national character, and may now be viewed as forming a single people.

History.—The oldest inhabitants mentioned in written history are the Helvetians, who, between 58 B.C. and 10 A.D., were subjugated by the Romans. (See *Helvetii.*) Before the fall of the Roman Empire in the West, Switzerland was occupied by the German confederation of the Alemanni; by the Burgundians and the Lombards; and by the year 534, under the successors of Clovis, it had become a portion of the Frankish Empire. Under the successors of Charlemagne it was divided between the Kingdom of France and the German Empire, but ultimately the whole country fell to Germany. For the most part, however, the dependence of Switzerland on Germany was merely nominal. The counts (originally local governors) conducted themselves as princes, assumed the name of their castles, and compelled the free inhabitants of their *Gaus* (districts) to acknowledge them as their lords. At the beginning of the thirteenth century the three forest cantons of Uri, Schwyz, and Unterwalden were subject to the counts of Hapsburg, who, although they were properly only imperial bailiffs (Vögte), yet regarded themselves as sovereign rulers. This claim the three cantons constantly refused to admit, and eventually (1291) leagued themselves together to oppose the usurpations of the house of Hapsburg. Tradition says that on the night of November 7, 1307, thirty-three representatives, with Fürst of Uri and his son-in-law, Tell, Stauffacher of Schwyz, and Arnold of Melchthal in Unterwalden at their head, met at Rütli, a solitary spot on the Lake of Lucerne, swore to maintain their ancient independence, and projected a rising of these cantons for the 1st of January, 1308. On the day fixed the rising took place, and the Austrian governors were deposed and expelled. But the events related of Tell are purely legendary. (See *Tell.*) A few years later the three cantons were invaded by the Hapsburgs; but the signal victory at the pass of Morgarten on the 15th of November, 1315, secured the independence of the cantons. The three united cantons were joined by the cities of Lucerne (1332) and Zürich (1351), the cantons of Glarus and Zug (1352), and the city of Bern (1353). Austria, which claimed jurisdiction over three of the newly-added members, namely, the city of Lucerne and the cantons of Glarus and Zug, again invaded the territory of the confederation, but was completely defeated at Sempach (where Arnold of Winkelried is said to have sacrificed his life for the sake of his fellow-countrymen) in 1386, and in 1388 at Näfels. The canton of Appenzell joined the confederation in 1411, and Aargau was wrested from the Austrians in 1415. The third war with Austria terminated in 1460, in favor of the confederation, which obtained Thurgau, Austria being thus deprived of all its possessions in the regions over which Switzerland now extends. In 1474, at the instigation of Louis XI of France, the Swiss turned their arms against Charles of Burgundy, invading his country and defeating his army near Héricourt. Charles, in revenge, invaded Switzerland, but the Swiss were again completely victorious, and in-

flicted several defeats upon the Burgundians at Granson in Vaud and at Murten (Morat) in Freiburg in 1476, and at Nancy in 1477, where Charles was slain. They admitted Freiburg and Solothurn into the confederation in 1481, and about the same time they concluded defensive alliances with several of the neighboring states. Their prosperity rose to such a height that all the courts around, even Austria, sought their friendship and alliance. The last war with Austria broke out in 1498. The Swiss had to undergo a severe struggle, but, victors in six sanguinary battles, they were, by the Peace of Basel in 1499, practically separated from the empire, a separation to which formal and international sanction was given in 1648. After this war they had no longer any enemy to fear, and their future wars were waged on behalf of foreign powers. In 1501 Basel and Schaffhausen, and in 1513 Appenzell (which had long been an ally), were admitted into full confederation. The number of the cantons was thus brought up to thirteen, at which it remained till 1798. The town and the abbot of St. Gall and the town of Bienne had seats and votes in the Diet without being in full federation; and there were besides six allies of the confederation not enjoying these privileges — the Grisons, Valais, Geneva, Neufchâtel, Mühlhausen, and the bishopric of Basel. In 1516 France gave up to Switzerland the whole of the present canton of Ticino.

In 1518 the Reformation began to make its way into Switzerland, chiefly through the efforts of Zuinglius at Zürich. Zuinglius fell at Kappel (1531), but his work was carried on by Calvin at Geneva. The effect of the Reformation was long to divide Switzerland into separate camps. Aristocracy and Democracy, Protestantism and Catholicism, struggled for the supremacy. Internal dissensions, religious and political, continued for nearly two hundred years. The last time the two great parties met victory declared itself for the Protestants. The period of tranquillity that followed was alike favorable to the progress of commerce, agriculture, and manufactures, and to the arts and sciences. In almost every department of human knowledge the Swiss of the eighteenth century, both at home and abroad, acquired distinguished reputation, as the names of Haller, Bonnet, Bernoulli, J. J. Rousseau, Lavater, Bodmer, Breitinger, Gessner, Sulzer, Hirzel, Fuseli, Hottinger, Johann von Müller, Pestalozzi, and many others witness. In the last years of the century the ferment of the French revolution spread to Switzerland; and in 1798 the ancient confederation was replaced by the Helvetic Republic, which lasted four years. In 1803 Napoleon I organized a new confederation, composed of nineteen cantons, by the addition of Aargau, Grisons, St. Gall, Ticino, Thurgau and Pays de Vaud. In 1815, by the compact of Zürich, Neufchâtel, Geneva and Valais were admitted into the confederacy, and the number of the cantons was thus brought up to twenty-two. This confederacy was acknowledged by the Congress of Vienna, which proclaimed the perpetual neutrality of Switzerland. and the inviolability of its soil. Again, in 1830 and in 1848, Switzerland was affected by the revolutionary movement in France, and a new federal constitution was introduced in the latter year. During the commotions of 1848 Neufchâtel set aside its monarchical form of government and adopted a republican one, and in 1857 it was put upon the same footing with the other cantons. Since that time the annals of Switzerland have little to record beyond the fact of constant moral and material progress. A revision of the federal constitution was adopted after a protracted agitation on the 19th of April, 1874, giving to the federal authorities more power. In the European war Switzerland was surrounded by the warring powers, but remained neutral.

Sword (sōrd), a weapon used in hand-to-hand encounters, consisting of a steel blade and a hilt or handle for wielding it. The blade may be either straight or curved, one-edged or two-edged, sharp at the end for thrusting, or blunt. The ancient Greek swords were of bronze, and later of iron. The Romans in the time of Polybius (B.C. 150) had short, straight swords of finely-tempered steel. The straight, long sword was used by the Christians of the West in the middle ages, while the Poles and all the tribes of Slavonic origin employed, and still prefer, the crooked sword or scimitar, which was also used by the Saracens, and is still the common one in the East. The double-handed sword of the middle ages was an unwieldy weapon, and probably originated from the wearing of plate armor. The sword is of much less importance in warfare than formerly, but European cavalry are still armed with it. From the former importance of the sword it came to be connected with various matters of ceremonial. The sword of state is one of the regalia, and the 'offering of the sword' one of the ceremonies of coronation. It is the emblem of power or authority, or of triumph and protection. Damascus, Toledo,

and Milan were anciently famous for their sword-blades. See *Broadsword*, *Cutlass*, *Rapier* and *Scimitar;* also *Cutlery* and *Fencing.*

Sword-fish, a fish allied to the mackerel and represented by the common sword-fish (*Xiphias gladius*), the single known species. It occurs in the Mediterranean Sea and Atlantic Ocean, but may also be occasionally found round the coasts of Britain. It attains a length of from 12 to 15, or even 20 feet, the elongated upper jaw, or sword, forming three-tenths of its length. Its body is covered with minute scales. Its color is a bluish-black above, and

Swordfish.

silvery white on the under parts. The ventral fins are wanting. It is fished for by the Neapolitan and Sicilian fishermen with the harpoon. Its flesh is very palatable and nutritious. It attacks other fishes, and often inflicts fatal wounds with its powerful weapon; and there are frequent instances in which the timbers of ships have been found to be perforated through and through by the sword-like jaw, which has been left sticking in the wood.

Swoyersville, a borough in Luzerne Co., Pennsylvania, organized from part of Kingston township. Pop. (1920) 6876.

Sybaris (sib'ä-ris), an ancient Greek city of Lower Italy, on the Gulf of Tarentum, supposed to have been built by a colony of Achæans and Trœzenians about 720 B.C. It rapidly rose to an extraordinary degree of prosperity, and the inhabitants were in ancient times proverbial for their luxury and voluptuousness. It was totally destroyed by the Crotonians, who turned the waters of the river Crathis against it (510 B.C.). Its name persists in the modern word Sybarite.

Sybel (sē'bl), HEINRICH VON, a German historian, was born at Düsseldorf in 1817, studied at Berlin under Ranke, and became professor at Bonn in 1844. In 1861 he was elected by the university to the Prussian Landtag, and in 1874 he was returned to the imperial parliament. In 1878 he was nominated director of the state archives. Of his works the best known is his *History of the French Revolution.* He also wrote a compendious history of the founding of the German Empire by William I. He died in 1895.

Sycamine. Same as *Sycomore.*

Sycamore (sik'a-mōr), a European species of maple (*Acer pscudoplatănus*), a large and well-known timber tree (called *plane* in Scotland); also, in the western parts of the United States, a name for the occidental plane or buttonwood. See *Maple* and *Plane-tree.* For the sycamore of Scripture see *Sycomore.*

Sycee-silver (sī sē'), the fine silver of China, cast into ingots weighing commonly rather more than 1 lb. troy. They are marked with the seal of some banker or assayer as a guarantee of purity.

Sychar (sī'kär). See *Shechem.*

Sycomore (sīk'u-mōr), a tree of the genus *Ficus*, the *F. Sycomŏrus*, or sycamore of Scripture, a kind of fig-tree. It is very common in Palestine, Arabia, and Egypt, growing thick and to a great height, and though the grain is coarse, much used in building, and very durable. Its wide-spreading branches afford a grateful shade in those hot climates, and its fruit, which is produced in clusters upon the trunk and the old limbs, is sweet and delicate.

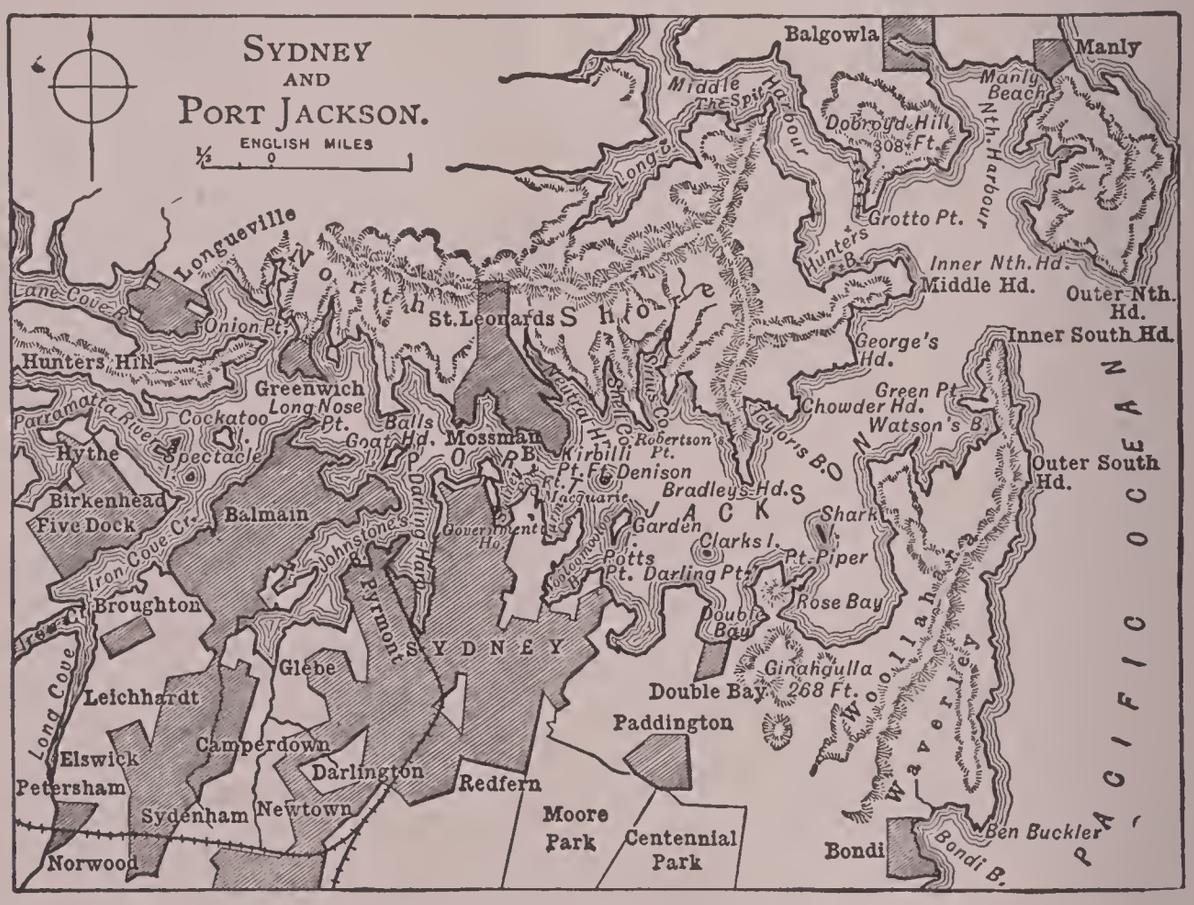
Sycosis (si-kō'sis), a pustular eruption on the chin, upper lip, or sides of the head, among the hairs, in the follicles of which the pustules have their chief seat.

Sydenham (sid'n-ham), a district in the county of Kent, 6 miles S. S. E. of London Bridge, a southern suburban section of London. Originally a village with mineral springs of some note, it was selected as the site of the Crystal Palace, opened in 1854. Pop. 50,804. See *Crystal Palace.*

Sydenham, THOMAS, an English physician, was born in Dorsetshire in 1624, took the degree of bachelor of medicine at Oxford in 1648, and died in 1689. He commenced practice as a physician at Westminster, and applied himself to an attentive observation of the phenomena of diseases. Febrile disorders and the gout attracted his especial notice. The Sydenham Society, which owes its name to him, have published an English translation of his works, which were all written in Latin.

Sydney (sid'ni), the capital of New South Wales and the parent city of Australia, is picturesquely situated on the southern shore of Port Jackson, the shore line being deeply indented by capacious bays or inlets which form

harbors in themselves, and are lined with wharves, quays, and warehouses. Some of the older streets are narrow and crooked, bearing a striking resemblance to those of an English town; but the more modern streets, such as George Street, Pitt Street, Market Street, King Street, and Hunter Street, rank high in order of architectural merit. The steam tramway system is extended to all parts of the suburbs, and water communication between the city and its transmarine suburbs, Balmain, North Shore, Manly Beach, etc., is maintained by numerous steam-ferries. Among the most important public buildings are the new government offices, magnificent white freestone structures in the Italian style; the town-hall, with a tower 200 feet high, and a very capacious great hall; the post-office, an Italian building with a tower 250 feet high; the government house; the university, a Gothic building with a frontage of nearly 400 feet, situated in a fine park; the free public library; school of art; public museum; St. Andrew's (Episcopal) Cathedral; St. Mary's (Roman Catholic) Cathedral; the Jewish synagogue; exchange; custom-house; mint; parliament houses; hospitals, asylums, and numerous other ecclesiastical, scholastic, and business buildings, which would not suffer by comparison with the edifices of older countries. The places of open-air recreation include the Domain, a beautiful park covering about 140 acres; Hyde Park, 40 acres, near the center of the city; the Botanical Gardens, the finest in the colonies, 38 acres; Moore Park, 600 acres; the Centennial Park, designed to commemorate the colony's centenary (1888), 768 acres; and the race-course, 202 acres. The entrance from the Pacific Ocean to Port Jackson, about 4 miles northeast of Sydney, is 1 mile in width, and is strongly fortified; the bay itself is about 10 miles in length and 3 in average breadth; it is well sheltered,



and has a depth of water sufficient to float the largest vessels. Besides wharves and quays there are dry-docks and other accommodation for shipping, and the trade of the port is very large. The principal exports are wool, tallow, hides, preserved meat, tin, copper, etc.; the imports, grain, tea, coffee, sugar, wine and spirits, ironware and machinery, cotton and woolen goods, wearing apparel, furniture, etc. Sydney was founded in 1788, and was named in honor of Viscount Sydney, the colonial secretary. It was incorporated in 1842. The discovery of gold in the colony in 1851 gave an immense impetus to its progress. The population has grown rapidly, the last

estimate giving 800,000, of whom about a fourth belong to Sydney proper and the remainder to the numerous suburbs.

Sydney, a city, county seat of Cape Breton Co., Nova Scotia, on Sydney Harbor and Canadian Government railways, 276 miles from Halifax. It is one of the great industrial centers of Canada; has immense iron and steel plants, woodworking mills, grist and carding mills, etc. It is a bunker port for many ocean liners and has steamer connection with Montreal, Halifax, Newfoundland, Prince Edward Island, etc., and Cape Breton ports. Center of a large coal field. Pop. (1920 est.) 30,000.

Sydney, Algernon and Sir Philip. See *Sidney.*

Sydney Mines, Nova Scotia. Pop. 7464.

Seyne (sī-ē'nē). See *Assouan.*

Syenite (sī'en-īt), a rock composed of hornblende and orthoclase felspar with occasionally a little quartz. It abounds in Upper Egypt, near Assouan, the ancient Syene, whence it derives its name. It often bears the general aspect of a granite, but is distinguished from that rock by the presence of hornblende and the comparative absence of quartz and mica. Granite which contains hornblende is called *syenitic granite,* and fine-grained syenite, containing large crystals of felspar, is called *syenitic porphyry.*

Sylhet. See *Silhet.*

Sylla. See *Sulla.*

Syllabus (sil'a-bus), a document issued by Pope Pius IX, Dec. 8, 1864, which condemned eighty current doctrines of the age as heresies. It is merely a catalogue of quotations from modern writers. It provoked conflicts between the papal and the civil power in Prussia, Austria, and Brazil.

Syllogism (sil'u-gizm), in logic, a form of reasoning or argument, consisting of three propositions, of which the two first are called the *premises,* and the last the *conclusion.* In this form of argument the conclusion necessarily follows from the premises; so that if the two first propositions are true the conclusion must be true, and the argument amounts to demonstration. Thus, plants have not the power of locomotion; an oak is a plant; therefore an oak has not the power of locomotion. These propositions are denominated the major premise, the minor premise, and the conclusion. The three propositions of a syllogism are made up of three ideas or terms, and these terms are called the *major,* the *minor,* and the *middle.* The subject of the conclusion is called the minor term (oak); its predicate is the major term (the power of locomotion); and the middle term is that which shows the connection between the major and minor term in the conclusion, or it is that with which the major and minor terms are respectively compared (plants). Syllogisms are usually divided into categorical, hypothetical, disjunctive, etc. The *quantity* and *quality* of propositions in logic — that is, whether they are said of all generally or only of some, and whether they are affirmative or negative — are marked by arbitrary symbols, as A, E, I, O. Every assertion may be reduced to one of four forms — the universal affirmative, marked by A; the universal negative, marked by E; the particular affirmative, marked by I; and the particular negative, marked by O. Examples of each of these are: All men are liable to err; no man is the exact counterpart of another; some men are wise; some men are not wise. From these, by combination, all syllogisms are derived. The rules of the syllogism may be thus briefly expressed: (1) In every syllogism there must be three and only three terms. (2) The middle term must enter universally (that is, inclusively or exclusively of a whole class) in one of the premises. (3) Neither the minor term nor the major must be used universally in the conclusion if not so used in the premises. (4) If both premises are affirmative the conclusion must be affirmative. (5) If either premise is negative the conclusion must be negative. (6) From two negative premises no conclusion can be drawn.

Sylphs (silfs), the elemental spirits of the air in the system of Paracelsus. The sylphs, like the other elemental spirits — the salamanders or spirits of fire, the gnomes or spirits of earth, and the undines or spirits of water — form the link between immaterial and material beings. They have many human characteristics, are male and female, and are mortal, but have no soul, and consequently suffer annihilation after death.

Sylt (silt), an island in the North Sea, off the coast of Schleswig-Holstein, to which province of Prussia it belongs; about 22 miles long, very narrow, but with a projecting peninsula on the east side; area, 40 square miles. It consists mainly of sand dunes, with some pasture for sheep. The inhabitants, about 4500 in number, are mostly Frisians by origin.

Sylvester I (sil-ves'ter), Bishop of Rome, 314-335, was represented at the Council of Nice, and is

said to have held a council at Rome to condemn the errors of Arius and others. The story of his having baptized Constantine and received Rome and its temporalities as a donation, is pure fiction. He is honored as a saint.

Sylvester II, pope, was born of an obscure family in Auvergne, named Gerbert, and at an early age entered the monastery of St. Gerard, in Aurillac. He traveled into Spain to hear the Arabian doctors, and became so distinguished that he was appointed by Hugh Capet preceptor to his son Robert. Otho III, emperor, who had also been his pupil, conferred upon him the archbishopric of Ravenna in 998; and on the death of Gregory V, in 999, procured his election to the papacy. He maintained the power of the church with a firm hand, was a great promoter of learning, and composed a number of works, particularly on arithmetic and geometry. He died in 1003. Among the vulgar he had the reputation of being a magician.

Sylvester, JAMES JOSEPH, mathematician, born at London in 1814, educated at Cambridge. He held professorships of mathematics at several institutions in England and the United States, being at Johns Hopkins University 1876-83, and after 1883 professor of geometry at Cambridge. He died March 15, 1897. He was a profound student of the higher algebra, made very important discoveries in mathematical science, and published many valuable scientific papers.

Sylvia (sil'vi-a), a genus of insessorial birds of the dentirostral tribe, type of the family Sylviadæ or warblers, of which *S. sylvicŏla* (wood-warbler or wood-wren), *S. trochilus* (the willow-warbler), *S. hortensis* (the garden warbler), and *S. rubecŭla* or *Erythăca rubecŭla* (the redbreast), are common examples.

Syl'viadæ. See above article.

Symbiosis (sim-bi-ō'sis; Greek, *syn*, together, *bios*, life), a sort of parasitism consisting in the living together or in close relationship of two species of animals, or two species of plants, or of some plant and some animal, each being of service to the other in some respect, as regards food, protection, etc. A well-known case is that of the pea-crabs, which live within the shell of various living molluscs.

Symbol (sim'bul), a sign by which one knows or infers a thing; an *emblem*. It is generally a definite visible figure intended to represent or stand for something else, as in the case of the common *astronomical symbols*, which are signs conveniently representing astronomical objects, phases of the moon, etc., and astronomical terms. Some of these symbols are so ancient that we can find no satisfactory account of their origin. The symbols for the chief heavenly bodies are as follows: — Sun ☉, Mercury ☿, Venus ♀, Earth ♁ and ⊕, Moon ☾, Mars ♂, Ceres ⚳, Pallas ⚴, Juno ⚵, Vesta ⚶. Jupiter ♃, Saturn ♄, Uranus ♅, Neptune ♆, Comet ☄, Star ✻. The asteroids, except the four given above, are represented by a circle with a number, thus (64). *Lunar Phases:* ● Moon in conjunction, or *new;* ☽ Moon in eastern quadrature, or *first quarter;* ○ Moon in opposition, or *full;* ☾ Moon in western quadrature, or *last quarter*. See *Ecliptic*. *Chemical symbols* are merely the first letters of the names of the chemical elements; or, when the names of two or more elements begin with the same letter, two letters are used as the symbol, one of which is always the first letter of the name of the element. Generally speaking the letters comprising the symbol are taken from the English name of the element; but in some instances, specially in the cases of metals which have been long known, the symbols are derived from the Latin names, as Fe (Lat. *ferrum*) for iron. See *Chemistry*.— *Mathematical symbols* are letters and characters which represent quantities or magnitudes, and point out their relations; as, a'', a_x; a^2, a_2; am, a; the signs, $+$, $-$, $\times$, $\div$, $:$, $\sqrt{}$, $\int$, $=$, $<$, $>$, etc.

Symbolics (sim-bol'iks), a theological term for the study of creeds and confessions of faith, etc., from the ancient meaning of the word *symbolon* (*symbolum*), a brief compendium, a creed.

Syme (sīm), JAMES, an eminent surgeon, born at Edinburgh in 1799; was educated at the High School and university of his native city, and studied anatomy under Barclay and Liston. In 1829 he opened Minto House Hospital as a surgical charity and school of clinical instruction; afterwards held professorships of clinical surgery in Edinburgh University and University College, London. Among his numerous writings are a *Treatise on the Excision of Diseased Joints* and *Principles of Surgery*. He died in 1870.

Symmachus (sim'a-kus), QUINTUS AURELIUS, a Roman writer, who flourished about 340-402 A.D., held important public offices under

Theodosius the Great, and was a zealous champion of the pagan religion. We possess ten books of letters by him, which are of importance for the history of the time.

Symonds (sī'mondz), JOHN ADDINGTON, an English writer of prose and verse, was born at Bristol in 1840, and educated at Harrow and at Balliol College, Oxford. His great work is the *Renaissance in Italy* (1875-86). Among his other works are: *Study of Dante; Studies of the Greek Poets; Sketches in Italy and Greece; Sketches and Studies in Italy;* translations of the Sonnets of Michael Angelo and Campanella; *Animi Figura*, a collection of sonnets; *Vagabunduli Libellus; In Nights and Days; Essays Speculative and Suggestive.* He died April 19, 1893.

Sympathetic Inks (sim-pa-thet'-ik), inks which remain invisible until acted upon by heat or by some other reagent. See *Ink.*

Sympathetic Nervous System, the name applied to a set of nerves in vertebrate animals, forming a nervous system distinct from, and yet connected with, the chief nerve-centers, or *cerebro-spinal nervous system.* They are specially connected with the processes of organic life, the movements of the heart and of respiration, the work of the stomach, etc., in digestion, the process of secretion in glands, etc. See *Nerve.*

Sympathetic Powder, in alchemy, a preparation which was reputed to have the property of curing a wound if applied to the weapon that inflicted it, or to a cloth dipped in the blood that flowed from it. It was said to be composed of calcined sulphate of iron.

Sympathetic Strike, a labor strike carried out by other crafts than the one primarily concerned, to the end that the first strike may be forced to a successful issue by a general cessation of business till the point in dispute in the initial strike may be decided. Of such a character was the great railroad strike in the United States in 1894, when the railroad employees struck in sympathy with the Pullman Car Company's employees. The principle has been developed in other strikes since, together with sympathetic boycotting of the goods of the contesting firms. The disposition to bring about a general strike of all industries has been shown recently on several occasions, especially that in France in 1909 and in Sweden in the same year, the latter being the most successful strike of this character ever attempted. Efforts to develop a sympathetic strike were made in Philadelphia during the street-car strike of 1910, but it quickly proved ineffective.

Sympathy (sim'pa-thi), in physiology, is that quality of the animal organization by which, through the increased or diminished activity of one organ, that of others is also increased or diminished. The idea of an organized system — the union of many parts in one whole, in which all these parts correspond to each other — includes the idea of a mutual operation, of which sympathy is a part. The sympathetic medium has been sometimes supposed to be the nervous system, sometimes the vascular or cellular system; but sympathy takes place between such organs as have no discoverable connection by nerves or vessels. The phenomenon of sympathy appears even in the healthy body; but its effect is much more often observed in diseases. *Sympathy* is further used to express the influence of the pathological state of one individual upon another, as in the contagion of hysteria or of yawning.

Symphony (sim'fu-ni), an elaborate musical composition for a full orchestra, consisting usually, like the sonata, of three or four contrasted, yet inwardly related movements. Haydn, Mozart, Mendelssohn, and Beethoven are the most successful composers of this class of compositions.

Sym'phytum. See *Comfrey.*

Sympiesometer (sim-pi-e-zom'e-ter), a kind of barometer in which the weight of the air is indicated by the compression of gas in a tube, the lower part of the tube being filled with some oily fluid and the gas occupying the upper portion.

Symptoms (sim'tums), in medicine, the phenomena of diseases, from which we infer the existence and the nature of the disease. Symptoms have their seat in the functions which are affected by the disease, and may be perceptible by the patient alone (for example, pain and all change of sensations), or by the physician also (for example, all diseased movements). The nervous, the vascular, and the cutaneous systems are affected in most diseases, and thus afford symptoms. If the symptoms are perceptible only to the patient they are called *subjective;* if to the physician without necessary reference to the patient, they are *objective.*

Synagogue (sin'a-gog; from the Greek *synagogē*, an assembly), the recognized place of public

worship among the Jews. Its origin, it is supposed, belongs most probably to the date of the Babylonish captivity in the abeyance of temple worship. The synagogues were so constructed that the worshipers, as they entered and as they prayed, looked towards Jerusalem. At the extreme east end was the holy ark, containing copies of the Pentateuch; in front of this was the raised platform for the reader or preacher. The men sat on one side of the synagogue and the women on the other, a partition 5 or 6 feet high dividing them. The chief seats, after which the scribes and Pharisees strove, were situated near the east end. The constitution of the synagogue was congregational, not priestly, and the office-bearers were not hereditary, but were chosen by the congregation. A college of elders, presided over by one who was the ruler of the synagogue, managed the affairs of the synagogue, and possessed the power of excommunication. The officiating minister was the chief reader of the prayers, the law, the prophets, etc. The servant of the synagogue, who had the general charge of the building, generally acted on week-days as schoolmaster to the young of the congregation. The right of instruction was not strictly confined to the regularly-appointed teachers, but the ruler of the synagogue might call upon anyone present to address the people, or even a stranger might volunteer to speak. The modern synagogue differs little from the ancient. Instead of elders there is a committee of management; and the women are now provided with seats in a low latticed gallery.—The *Great Synagogue* was an assembly or council of 120 members said to have been founded and presided over by Ezra after the return from the captivity. Their duties are supposed to have been the remodeling of the religious life of the people, and the collecting and redacting of the sacred books of former times.

Synclinal (sin-klī'nal). See *Anticlinal.*

Syncopation (sing-ku-pā'shun), in music, an alteration of the rhythm, by driving the accent to that part of a bar not usually accented.

Syncope (sin'ko-pē), the name given to that form of death characterized by failure and cessation of the heart's action as its primary feature. The term is also applied to the state of fainting produced by a diminution or interruption of the action of the heart, and of respiration, accompanied with a suspension of the action of the brain and a temporary loss of sensation, volition, and other faculties. Fatal syncope is usually the result of some nervous 'shock' resulting from a severe lesion of organs, from a want of blood, or an altered and abnormal state of blood pressure. Ordinary syncope is caused chiefly by weakness, mental emotion, etc.

Syndicates (sin'di-katz), originally, councils or bodies of syndics; afterwards, associations of persons formed with the view of promoting some particular enterprise, discharging some trust, or the like; now, combinations of capitalists for the purpose of controlling production and raising prices. Syndicates in the United States are known as trusts.

Syndicalism (sin'di-cal-izm), a system of labor agitation marked by its revolutionary methods and acts of violence as distinct from political or social procedure. The chief exponents of syndicalism in America are the Industrial Workers of the World. The ideal is the unification of labor in one great federation. It proposes that the control of the technical processes now exercised by the capitalist shall pass to various groups of organized workers. In Great Britain and the United States special emphasis is laid upon the organization of labor by industries rather than by crafts. Syndicalism advocates a policy of uncompromising hostility between labor and capital, and of 'direct action,' such as the general strike or sabotage. Syndicalism is declared a crime in many states, and provision is made for the punishment of teachers of sabotage or those advocating other methods of terrorism, or the destruction of life or property for the accomplishment of social, economic or political ends.

Synge (sing), John Millington, an Irish dramatist and poet, born near Dublin in 1871, and died there March 24, 1909. He was associated with Yeats in the direction of the Abbey Theater, Dublin; and spent much time on the Continent as well as in the west of Ireland. His plays include *Riders to the Sea* (1905), *In the Shadow of the Glen* (1905), *The Well of the Saints* (1905), *The Playboy of the Western World* (1907), *Deirdre* (1910).

Syngnathus. See *Pipe-fishes.*

Synod (sin'od), an ecclesiastical assembly convened to consult on church affairs. A synod may be diocesan, composed of a bishop and the clergy of his diocese; or provincial, of an archbishop and the bishops and clergy of his province; or national, of the whole clergy of a state under a papal legate. Synods of the Presbyterian Church are

courts of review standing between the presbyteries and the General Assembly, and embracing a certain number of associated presbyteries, the clergy and elders of which constitute the respective synods. See *Assembly (General)* and *Presbyterians.*

Synodical Period (si-nod'i-kal), in astronomy, the period between two successive conjunctions or oppositions of two heavenly bodies. A synodical month is a lunation, being the period from one full moon to the next full moon, or from new moon to next new moon. It is 29 days, 12 hours, 44 minutes, 2.37 seconds.

Synonyms (sin'u-nimz), or words having the same signification, strictly speaking, do not exist in any language; and in the popular use of the term synonyms are words sufficiently alike in general signification to be liable to be confounded, but yet so different in special definition as to require to be distinguished. The opposite of synonyms are *antonyms.*

Synoptic Gospels (si-nop'tik), a term applied to the gospels of St. Matthew, St. Mark, and St. Luke, which present a synopsis or general view of the same series of events. In St. John's gospel the events narrated are different. See *Gospels.*

Synovial Membrane (si-no'vi-al), the membrane lining the various joints or articulations of the higher animals, and which secretes a peculiar fluid — the *synovial fluid* — for the due lubrication of the joint. The structure of the synovial membrane resembles that of the serous membranes (which see). Its secretion is a thick viscid fluid somewhat resembling white of egg in general appearance. It is yellowish-white in color, has an alkaline reaction, and a saline taste.

Syntax (sin'taks), that part of grammar which treats of the manner of connecting words into regular sentences, constructing sentences by the due arrangement of words or members in their mutual relations according to established usage. In every language there is some fundamental principle which pervades and regulates its whole construction, although it may occasionally admit of particular variations. In some languages the principle of juxtaposition prevails, and little diversity of arrangement is possible, as is the case in English, in which inflections are so few. The relations of the subject, the action, and the object are indicated by their respective positions. In other languages — inflected languages like Latin or Greek — these relations are indicated by the changes in the forms of the words, and the modes of arrangement are various.

Synthesis (sin-thi-sis). See *Analysis.*

Synthetic Rubber, a variety of rubber produced by experiment in a chemical laboratory instead of in nature's workshop. Its production has been announced several times of recent years, but none of the processes has yet reached the commercial stage. According to recent experiments of Prof. W. H. Perkins, of Manchester University, however, the production offers the probability of profit at a price of sixty cents per pound, with the possibility of its production at twenty-four cents a pound or less.

Syphilis (sif'i-lis), a contagious and hereditary venereal disease, usually communicated by sex intercourse, characterized in its primary or local stage by chancres or ulcers on the genitals, succeeded by inguinal buboes. The indications of a secondary or constitutional affection are ulcers in the throat, copper-colored eruptions on the skin, pains in the bones, nerves, etc. The name of this disease is traced to a poem written in Latin hexameters by the Italian Fracastoro, and published in 1530. Its history is one of the most difficult parts of the history of medicine. It is impossible to say when or where the disease originated, but it appears to have occurred in Europe and certain parts of Asia from the earliest times, and has gradually spread over the whole globe. During the latter part of the fifteenth century it assumed an epidemic form, and spread throughout the whole of Europe. Like other diseases, it gradually diminished in virulence, particularly after Paracelsus had found in mercury a useful remedy against it. It has recently been discovered that this disease is due to a protozoön, *spirochaete pallida,* and what is claimed to be a remedy for it was discovered by Paul Ehrlich, a German chemist. See *Salvarsan.* The results of its use, so far, appear very promising, though they may not prove permanent, and some serious results have followed its application. These effects may be due to some fault in its preparation.

Syphilization (sif-il-i-zā'shun), the treatment of syphilis by means of repeated syphilitic inoculations. It was originated by M. Auzias, of Turin, in 1844.

Syphon. See *Siphon.*

Syra (sē'rä), the ancient *Syros*), a Greek island in the Ægean Sea, in the middle of the Cyclades, 10 miles

long and 5 broad. Anciently clothed with forests, and very fertile, it is now for the most part a brown and barren rock. Its inhabitants, only about 1000 at the beginning of the century, were largely recruited by refugees at the outbreak of the war of Greek independence, and latterly it has become the commercial center of the archipelago. Pop. 31,939. — SYRA, or HERMOPOLIS, the capital, is built round the harbor on the east side of the island. It is the seat of government for the Cyclades, and one of the most important seaports of Greece. Pop. 18,132.

Syracuse (sir'a-kūs; now *Siracusa*), anciently the chief city of Sicily, on the east coast of the island, one of the most magnificent cities in the world, with 500,000 inhabitants, is now greatly reduced, but still has an excellent harbor, capable of receiving vessels of the greatest burden. The ancient city was of a triangular form, 22 miles in circuit, and consisted of four parts surrounded by distinct walls; the modern city is confined to the small island of Ortygia, and is only about 2½ miles in circumference. It is defended by walls with bastions, and has many interesting remains and memorials of former times. The cathedral is the ancient temple of Minerva, and there are remains of amphitheaters and other Roman works. Syracuse was founded by a colony of Corinthians under Archias, B.C. 734, and, according to Thucydides, possessed a greater population than Athens or any other Grecian city. Among the most famous of its ancient Greek rulers were Gelon, Dionysius the elder and the younger, and Hiero I and II (see these articles). It was unsuccessfully besieged by the Athenians in B.C. 414; but fell into the hands of the Romans, after a three years' siege, in B.C. 212; and continued in their possession till the downfall of their empire. In 878 it was destroyed by the Saracens, and the mainland portion of the city has never since been rebuilt. Syracuse is the seat of an archbishop, and since 1865 has been the capital of a province of the same name. It has some manufactures of drugs, chemicals, and earthenware, and a considerable commerce, principally in wine. It is the capital of a province of the same name. Pop. 44,094.

Syracuse, a city, situated in Onondaga Co., New York, of which it is the county seat, midway between Albany and Buffalo, on the New York Central, West Shore, and the Delaware & Lackawanna railroads; and on the New York State Barge Canal. It is a progressive city, with broad, well-shaded streets and beautiful parks. It is the seat of Syracuse University (founded 1870, with colleges of Liberal and Fine Arts, Medicine, Law, Applied Science, Agriculture and Forestry; students, 5000). Other fine buildings include the Court House, City Hall, Public Library, Y. M. C. A. building, high school buildings, etc. Syracuse is an important industrial and commercial center. The manufacture of salt was formerly the leading industry, but the industries are now very diversified, including metals and many manufactures of metals, fine tool steel, typewriting machines, automobiles and automobile accessories, electrical apparatus, agricultural implements, china, soda ash, knit goods, furniture, shoes and clothing. In 1789 salt works were established here, the settlement changing its name several times until 1825, when it was incorporated under its present name. A feature of interest is the Onondaga Indian Reservation, the capital of the Six Nations, 6 miles to the south of the city. Pop. (1910) 137,249; (1920) 171,717.

Syr-Daria. See *Sir-Daria.*

Syria (sir'i-a), a country forming part of Asiatic Turkey, and bounded on the north by the Taurus range, on the northeast by the Euphrates, on the east by the Syrian desert, on the south and southeast by Arabia, on the southwest by Egypt, and on the west by the Mediterranean; area, estimated at about 70,000 square miles. The coast has some low sandy tracts, but is in general, though not deeply indented, lofty and precipitous, rising, particularly in Mount Carmel, to the height of 3000 feet. The only good harbors are those of Beyrout and Alexandretta (Scanderoon). In Lebanon the mountains reach a height of about 10,000 feet. Between the two parallel ranges of Libanus and Anti-Libanus is the valley of Cœle-Syria, whence the Orontes flows northwards, turning westwards at Antioch, and falling into the sea at the ancient Seleucia. The principal river of South Syria (Palestine, which see) is the Jordan. In the course of the Jordan are the lakes of Merom and Tiberias, and at its mouth is the far larger lake, the Dead Sea. Much of the soil, more especially in the valleys of Lebanon, is very fertile; but agriculture is not pursued with as much zeal as in ancient times. Nevertheless, the orchards of Damascus and the cornfields of Hauran are celebrated, and the olive-tree and the vine are found in all parts. The country is poor in minerals; the native manufactures in silk, cotton,

and wool have been paralyzed by the import trade from Europe; and the caravan trade has almost entirely ceased. The inhabitants, roughly estimated at about 2,500,000, consist chiefly of two elements, the Aramaic and the Arabic, the latter including Bedouins and town and peasant Arabs. Jews are found only in the large towns, and have immigrated back from Europe. The language generally spoken is Arabic, but with Aramaic elements. The Mohammedans comprise about four-fifths of the population, and the Christians one-fifth. Syria at an early period became part of the Assyrian Empire, and afterwards passed to the Persians, the Greeks, and the Romans. It formed part of the Byzantine Empire, but was taken by the Arabs in 636, by the Seljuk Turks in 1078, by the Crusaders, whose kingdom of Jerusalem lasted till 1293, by the Mamelukes, who united it with Egypt, and by the Ottoman Turks, who added it to their empire in 1517. The most important events in the modern history of Syria are its conquest by Mehemet Ali of Egypt in 1833, and its restoration to Turkey in 1840 by the intervention of the great European powers; and the war between the Druses and Maronites which broke out in 1860, peace being restored in 1861 only by the active efforts of a French force sent out under sanction of Turkey and the western powers. In 1887 Syria was divided into two vilayets, one having Damascus as its capital, the other Beyrout. Lebanon (250,000 inhabitants) has a special government, and is under a Christian Mutessarrif.

Syriac (sir'i-ak), a dialect or branch of the Aramaic, and thus one of the Semitic family of languages. (See *Aramæan.*) It was a vernacular dialect in Syria during the early centuries of our era, but ceased to be spoken as a living language about the tenth century, being crowded out by that of the Arabian conquerors. A very corrupted form of it, however, is still spoken by a few scattered tribes, and principally by the Nestorians of Kurdistan and Persia. Syriac literature had its rise in the first century of our era. At first it was chiefly connected with theological and ecclesiastical subjects, Biblical translations and commentaries, hymns, martyrologies, liturgies, etc., but in course of time it embraced history, philosophy, grammar, medicine, and the natural sciences. The oldest work in the language still extant is the incomplete translation of the Bible called the Peshito. (See *Peshito.*) In addition to the Peshito Version, which was recognized as the authorized version by all the various sects of the Syrian Church, there is one made in the beginning of the seventh century by Paul of Tela, a Monophysite; this is based on the Hexaplar Greek Text, that is, the Septuagint with the corrections of Origen, and is of very great value for the criticism of the Septuagint, supplying as far as a version can the lost work of Origen. Another version, the Syro-Philoxenian, translated by Polycarp under the auspices of Philoxenus, bishop of Hierapolis (488-518), and revised by Thomas of Heraclea in 616, is very inferior to the Peshito. Among the MSS. brought by him from Syria in 1842 Dr. Cureton discovered an imperfect copy of the Gospels, differing widely from the common text, and which he supposed to belong to the fifth century. The most learned representative of the orthodox Syrian Church is undoubtedly Ephraem Syrus, who flourished in the fourth century. The Syriac literature, like the language, was superseded by that of the Arabians. The latest Syriac classic writer is Bar-Hebræus, bishop of Maraga, who died in 1286. The greater part of this literature has been lost, but much valuable material still remains unedited.

Syrian Christians, or CHURCH OF THE SYRIAN RITE, that section of the Christian church which had its stronghold in Syria, and which was originally included in the Patriarchate of Anticch, and subsequently in that of Jerusalem. Up to the end of the fourth century the Syrian Church was in a very flourishing condition, having at that time a membership of several millions; but controversies arising on the incarnation, it split up into several sects, such as the Maronites in Lebanon, the Jacobites in Mesopotamia, the Christians of St. Thomas in India, and the Nestorians in Kurdistan. The term Syrian Christians is frequently specially applied to the latter community.

Syringa (sir-ing'ga). See *Lilac.*

Syringe (sir'inj), an instrument consisting of a cylinder of metal or glass fitted with an air-tight piston, which is moved up and down by means of a handle. In its simplest form it is destitute of valves, one simple aperture at the extremity serving for the admission and ejection of fluid; those provided with valves, however, are available, on a small scale, for all the purposes of an air-pump.

Syrrhaptes. See *Sand-grouse.*

Syrtes (sêr'tēz), two large gulfs of the Mediterranean on the coast

of Africa. The Lesser Syrtis, or Gulf of Cabes, lies on the east coast of Tunis; the Greater Syrtis, or Gulf of Sidra, lies between Tripoli and Barka. The navigation of the Syrtes was anciently considered very dangerous.

Syrup (sir'up), in medicine, a saturated, or almost saturated, solution of sugar in water, either simple, flavored, or medicated. In the sugar manufacture, a syrup is a strong saccharine solution which contains sugar in a condition capable of being crystallized out, the ultimate uncrystallizable fluid being called treacle or molasses.

Syzran, or SYSRAN (siz-ran'y'), a town of Central Russia, in the government of Simbirsk, and 90 miles south of the city of that name, a few miles from the Volga. It has tanneries, flour-mills, etc., and large exports of grain. Pop. 33,046.

Syzygy (si'zi-ji), in astronomy, the conjunction or opposition of any two of the heavenly bodies. See *Moon.*

Szabadka (så-båd'kå). See *Theresiopel.*

Szarvas (sår'våsh), a town of Hungary, county of Bekes, on the Körös. Pop. 25,773.

Szatmar (såt'mär), a royal free town of Hungary, in a marshy plain on the Szamos, 69 miles E. N. E. of Grosswardein. It has a considerable trade in wine and wood, is the seat of a Roman Catholic bishop, and contains a cathedral. Pop. 26,881.

Sze-chuen (sā'chö-ån'), a large province in the west of China; area, 166,800 square miles. The surface is generally rugged and full of defiles, especially in the west, where many peaks rise far above the snow-line, but there is a plain of some extent surrounding Ching-too-fo, the capital. The principal river is the Yang-tse-kiang. The soil is only moderately fertile, but there are some metallic ones. Pop. est. about 70,000,000.

Szegedin (seg'e-din), a royal free city of Hungary, capital of the county of Csongrad, at the confluence of the Maros and Theiss, 60 miles west of Arad. It is second only to Budapest, and is a great center of commerce and agriculture. It has numerous industrial establishments, large salt and tobacco magazines, and a considerable shipping trade, especially in coal and timber. The town was almost completely destroyed by an inundation in March, 1879, but great embankments have since been built for its protection, and the whole town reconstructed, some fine public buildings having been erected. Pop (1910) 118,328.

Szegszard (seg'särd), a market town of Hungary, 81 miles southwest of Budapest, on the Sarviz. Pop. 13,895.

Szekler (sek'lėr), a Hungarian people inhabiting Transylvania, and preserving the Magyar characteristics in their purest form.

Szentes (sen'tesh), a town of Hungary, in the country of Csongrad, 29 miles N. N. E. of Szegedin. The inhabitants are chiefly engaged in agriculture and fishing. Pop. 31,308.

Szigeth (si'get), or SZIGETVAR, a town of Southwestern Hungary, formerly an important fortress, and in 1866 maintained a heroic resistance to a great Turkish army, which was continued until the fortress had become a heap of ruins and all the defenders were slain.

Szigeth, or MARAMANO-SZIGETH, a town of Northeastern Hungary, on the Theiss, at the foot of the Carpathians, a salt-mine depot and a center of the lumber trade. Pop. 17,445, one-third being Jews.

Szolnok (sol'nok), a market town of Hungary, on the Theiss and the Zagyva, is the junction of four railways, and has a considerable trade in tobacco, salt, and wood. Pop. 25,379.

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